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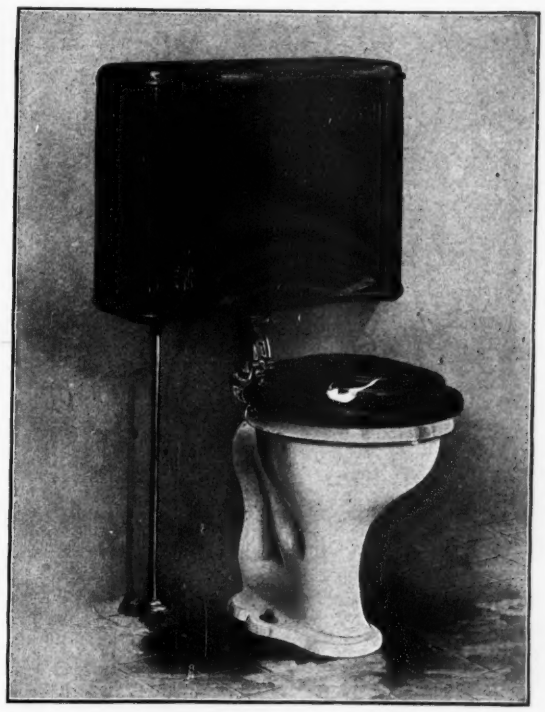

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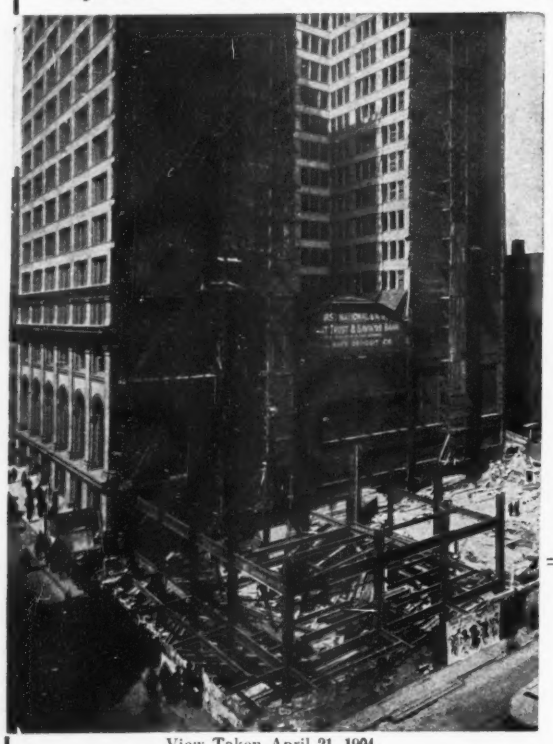

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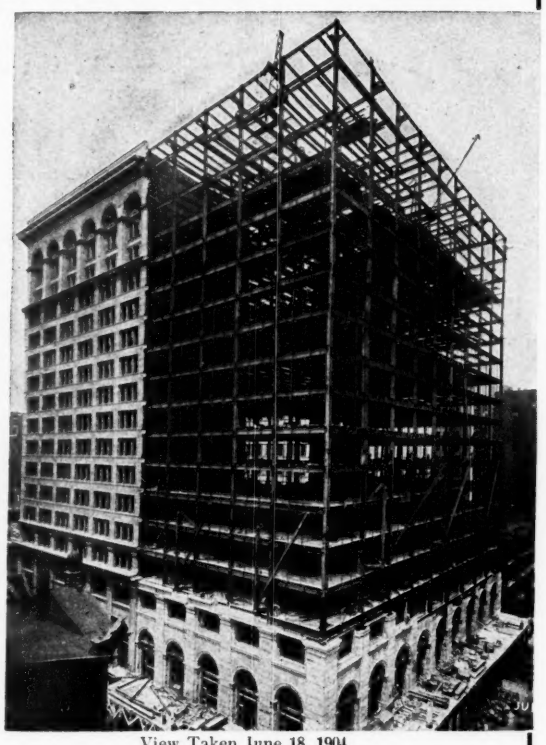

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Needed Revision of Plumbing Laws

No parts of our building laws stand in greater need of revision than those which relate to plumbing and household sanitation.

The public seems to labor under the impression that sanitary engineering is a matter as far beyond its comprehension as celestial mechanics, and to have made up its mind that all it can do is to endure a necessary evil as patiently as possible, make it its first rule to allow as little plumbing as possible in the house, and look for relief to the scientists. But the scientific professions seem to have also found the subject too difficult for them, and they in turn have handed the whole matter over bodily to the "practical plumber." So practically the most important branch of building construction, the branch most directly affecting the health and comfort of the public, has been almost exclusively left in the hands of the plumbers and supply dealers. And these men have taken hold of the responsibility bravely and unflinchingly, and, under their liberal guidance the science has assumed proportions which literally staggers the house owner, and still more bewilders the ordinary scientist. The increasing complication made the work of the plumber much more difficult, but he never for a moment flinched nor complained of this extra burden so long as he could add anything to the magnificent fabric he had elaborated, and erect another barricade against the entrance of the "deadly sewer gas" into the home of his client.

In return for all this unselfish zeal the ungrateful public is now beginning to turn upon its benefactors and accuse them of overdoing the thing for their own profit. They forget that the plumbers really rather lose than gain financially from the resulting complication. They have more pipe jointing to do, it is true, but this is more routine work. They lose much more than they gain in that there is a corresponding reduction of the good fixtures which the owner can afford to have, and the gas fitter and pipe layer tend to supplant the old time skilled plumber.

As a matter of fact the wrath of the public should be turned not against the plumber, but rather against the pipe dealer, who is the only real beneficiary in all this extra and unnecessary work.

Still it must be admitted that the confidence of the public in the plumbing fraternity has been badly shaken, unjustly though it may be, and they are turning again to the architects and physicians, civil and sanitary engineers, for relief, and the recent meetings on the subject at the Massachusetts Institute of Technology and before the architectural association of Providence is a result of a call by the architectural profession.

We print in this issue the first part of an essay on "Sanitary Engineering in the Modern Office Building," by a Boston architect who has made a very exhaustive study of this branch of his profession, and conducted original researches which have already resulted in simplifying the plumbing ordinances of some of our cities.

Mr. Putnam invites the further coöperation of his fellow architects and engineers and of boards of health in the endeavor to place these ordinances on a more scientific basis, and will suggest that commissions be appointed to investigate judicially and impartially the entire subject of plumbing legislation. If it is true that the public are paying twice as much for their plumbing work as is necessary and obtaining as a result only greater and greater *insecurity*, the sooner the facts are known the better. The cost of such an investigation by a state or national commission of experts, which would settle the matters in dispute permanently and for all the cities in the country at once, need not exceed that of the unnecessary piping and trapping, if Mr. Putnam's contentions are sound, in a single large office building.

Foes of the Skyscraper Vanquished

With the introduction in Chicago some twenty years ago of the type of building known as the skyscraper, engineers and architects faced many new problems in construction and had to devise protection from new dangers to safe building. From the isolated pier foundation with its strength scientifically adjusted to sustain its individual load, the course has been to the present day concrete pile resting upon bedrock, by which all possible danger by the corrosion of iron and steel weighted foundations is overcome. Not only is extreme care taken to prevent corrosion of all steel and iron used in the huge framework of the building by coverings practically impervious to moisture, but a great factor of safety is calculated in provision against vibration by which movement under the highest winds if not entirely prevented is reduced to such a minimum as to be of little consequence. The most advanced electrical science has been drawn upon to prevent danger to the steel skeleton from electrolysis by perfect insulation and avoidance of possible leakage. The lessons of the fires to which these high buildings have been subjected have been so carefully studied by the experts in fireproof construction that the building of today has many safeguards against the fire foe that were not known or regarded necessary in the earlier structures. It is possible that the skyscraper is destined to encounter peril from conditions not known to present day science, but as now constructed their permanence is assured against all known dangers.

Hollow Concrete Building Blocks

For the past few years the architects, especially in the West, have had urged upon their attention the hollow concrete building block for entire buildings of all classes. Few architects as yet have been called upon to design structures of this material, but its manufacture is developing so rapidly that the profession should lose no opportunity to thoroughly investigate the subject. The days have passed when the chief argument in favor of the use of this material was that it was a good imitation of stone at a low price. Today the hollow concrete building block is offered on its merits as a building material in competition with wood, natural stone, hollow clay blocks, or iron. There is scarcely room to doubt that this material can be made so that it will meet all practical requirements as to non-absorption of moisture, compressive strength and great resistance to fire; also, it can be given any variety of color, and be hand dressed to any desired surface. To retain a permanent market for these blocks the progressive manufacturers interested are fully aware that there must be established a high standard of quality acceptable to the insurance interests, municipal building departments and to the architects; and that all blocks that do not conform to this standard must be condemned and discarded. While official tests of the severest character are now under way, and the results will be published at no distant day, sufficient tests already have been made to establish the fact that manufactured with proper care and intelligence hollow concrete blocks are a valuable building material, combining low cost, strength, durability and fireproof qualities of high degree.

Labor Disputes and Use of Concrete

Curiously enough labor disputes have been, perhaps, the most efficient factor in bringing concrete again into use among building contractors. The stone masons, who had formerly almost a monopoly of the business of constructing foundation walls, have not always, as it seemed to the contractors, been perfectly reasonable in their demands, and the quarrymen, without whom their work could not go on, were even more liable to misunderstandings with their employers. At last the latter, in despair at the losses to which they were subjected by alternate strikes in these two trades and encouraged by the reduction in cost of cement, began to turn again to the use of concrete, not only for footings, but for foundation walls. The ordinary contractor's concrete of ten or fifteen years ago would have been a very unsuitable material for retaining walls, on account of its inequality of composition, due mainly to bad mixing; but good concrete is a very different affair, and, under the stimulus of self interest, contractors have studied the subject until careful and intelligent preparation of the materials, aided by the well designed mixing machines now available, has so far taken the place of the ignorant methods formerly in use that reasonably good concrete for foundations can now be had anywhere at a price which compares favorably with that of stone work.

Considering the superiority of good concrete over stone work in the qualities required in foundation walls, in resistance to the pressure of the earth, in imperviousness to moisture, and in the smoothness of the inner and outer surfaces, there can be no doubt that the new material will be more and more extensively employed and that the characteristic ingenuity of Americans will adapt it to an increasing number of uses. Already building blocks of concrete, made on the spot by portable machines, have come into use in many places, instead of brick. Being molded with hollow spaces, they make a light and non-conducting wall, as well as a strong and impervious one, and seem destined not only to take an important part in American construction, but to influence the artistic development of American architecture which can not be more fruitfully employed than in adapting design to new materials.

SANITARY ENGINEERING IN THE MODERN OFFICE BUILDING.

BY J. PICKERING PUTNAM, ARCHITECT.

In treating the subject of sanitary engineering for the readers of THE INLAND ARCHITECT, I find it necessary to call attention at once to the fact that science and practice in this domain are, in the most vital particulars, directly at variance with one another, and that consequently nearly every detail depending upon these fundamentally conflicting main principles must be examined critically and independently from the start.

The plumbing laws operative at the present time in most of the principal cities of the country are based on the ideas of more than a decade back, and, as governing the general practice of today, are, like it, directly opposed to the actual demonstrations of science and to the teachings of acknowledged modern authorities.

Hence the only possible way to present anything of the least value in this most important department of architecture is to break entirely away from the conventions of ordinary practice and base all our conclusions upon direct personal investigations and absolute demonstration. Our treatment must therefore necessarily become largely critical and argumentative throughout, and, although this method of handling the subject is certain to arouse from many quarters adverse criticism and possibly some bitterness, it is nevertheless evidently unavoidable, and will also have the great advantage of making the matter vastly more interesting and we hope much more intelligible to the reader.

It is also useful and gratifying to record here that some of the more progressive cities are becoming independent enough to adopt these more modern and scientific principles, and are simplifying their ordinances and requirements along nearly all the lines which will be found advocated in these articles; and the author takes this occasion to refer with great satisfaction to letters from the heads of boards of health of many large cities, and from leading architects and engineers, endorsing most heartily his conclusions, inviting his suggestions for the revision of their local plumbing laws (a copy of one of which will be presented at the end of this treatise), and in return proffering aid and encouragement in the dissemination of these views tending toward the adoption of more rational and simpler plumbing construction.

Looked at from the standpoint of the modern office building it may be said that the rolling mill is coöperating with the microscope in revolutionizing the practice of sanitary engineering.

To the latter we owe discoveries in bacteriology which have, almost within the last decade, sufficed to fundamentally alter our views as to the nature and proper treatment of sewage; and to the former the astonishing development of the modern "skyscraper" which is doing much to open our eyes to the absurdity of the old ideas and methods of plumbing.

Fig. 1 shows for illustration a plumbing stack in one of these twenty- or thirty-story office buildings constructed after the requirements of the present faulty laws; and Fig. 2 shows the same fixtures plumbed in accordance with the teachings of modern science.

I propose to call attention briefly to some of the most serious defects of the first arrangement, and later to examine them more in detail, and review the demonstrations upon which we have based our preference for the second and simpler system.

The office building illustrated is provided, as is not uncommon, with a restaurant, kitchen and caterer's or caretaker's living and bath rooms in an upper story.

The present laws in most cities, in the first place, still insist upon the use of fully double the amount of piping and labor required for producing the best results. The trap of every fixture must be "back vented" by a special air pipe extending practically from basement to roof, and in order to offset as far as possible the effect of friction, this special air pipe must be rapidly increased in sectional area as it ascends toward the roof. It is beginning to be understood by the public that the element of friction against the walls of this enormously long "back vent" pipe plays an extremely important role in nullifying whatever usefulness it might otherwise have as a protector of the trap seals against siphonage, and that, on the other hand, this same exaggerated length increases proportionally the rapidity of the air current it conveys over the trap seals, and correspondingly the speed of their destruction by evaporation. Thus the "back vent" pipe introduces a new danger far greater than the one it was erroneously expected to remove.

It is now known that ordinary "round" or "pot" traps of large diameter are practically proof against siphonage and that they may be kept thoroughly scoured and aërated by simple unpatented flushing devices, so that not even the shadow of an argument exists any longer for the evil of "back venting." The simple system shown in Fig. 2 has been proved to afford absolute security.

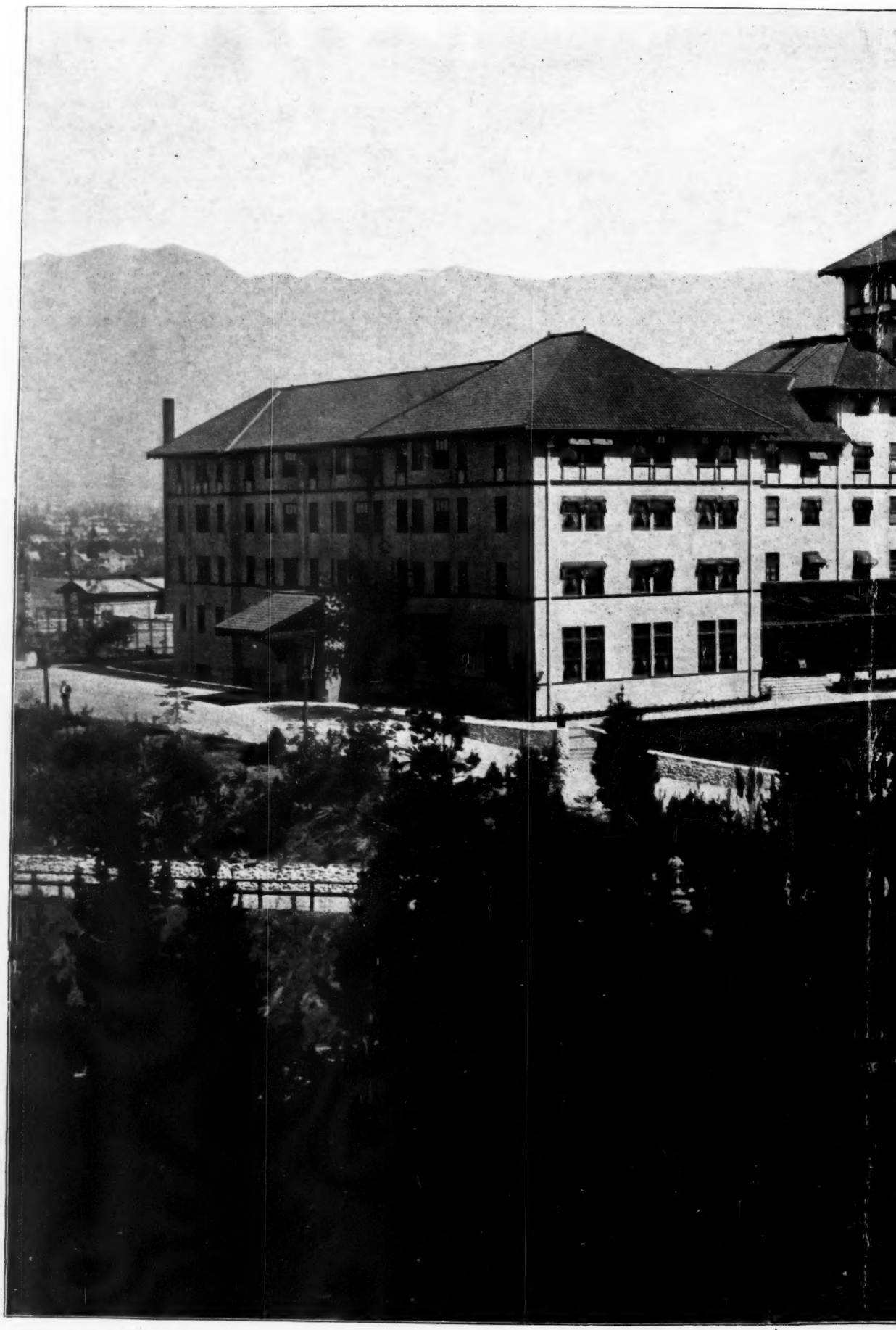
We see in Fig. 1 some of the many ways in which the back vent pipe fails in practice. Clogging with grease is shown over the sink trap in the top story and is known to be very common.

At every quick bend under a long vertical run of iron vent pipe rust is certain to collect in large quantities as shown in the basement. A comparatively small amount of flaking off of rust or sediment in such a place may suffice to destroy the efficiency of the pipe.

Sagging, as shown higher up in the tenth story, is another frequent cause of failure. Water and sediment collect in the sagged portion, and failure is the result. Finally *hoar frost and snow* often close the upper opening of the pipe above the roof, producing again failure. The main soil pipe can not be closed with frost at the top when the main house trap is omitted because the warm air of the sewers will then constantly rise through the pipe and be able to melt the accumulation as fast as it could form. But in this antiquated system of piping the very best opportunities for ventilation are obstructed by useless trapping.

The chances of leakage in the back vent pipe are evidently increased in proportion to the increase of piping, and, what is more important still, no water flush passes through the vent pipes, and there is consequently nothing to announce to the eye the presence of leaks, which may therefore do their mischief before they are discovered.

A drawing somewhat like this was used to illustrate a paper on trap ventilation I read some time ago before the Boston Society of Architects. The society then voted unanimously to make an effort to have the back vent law



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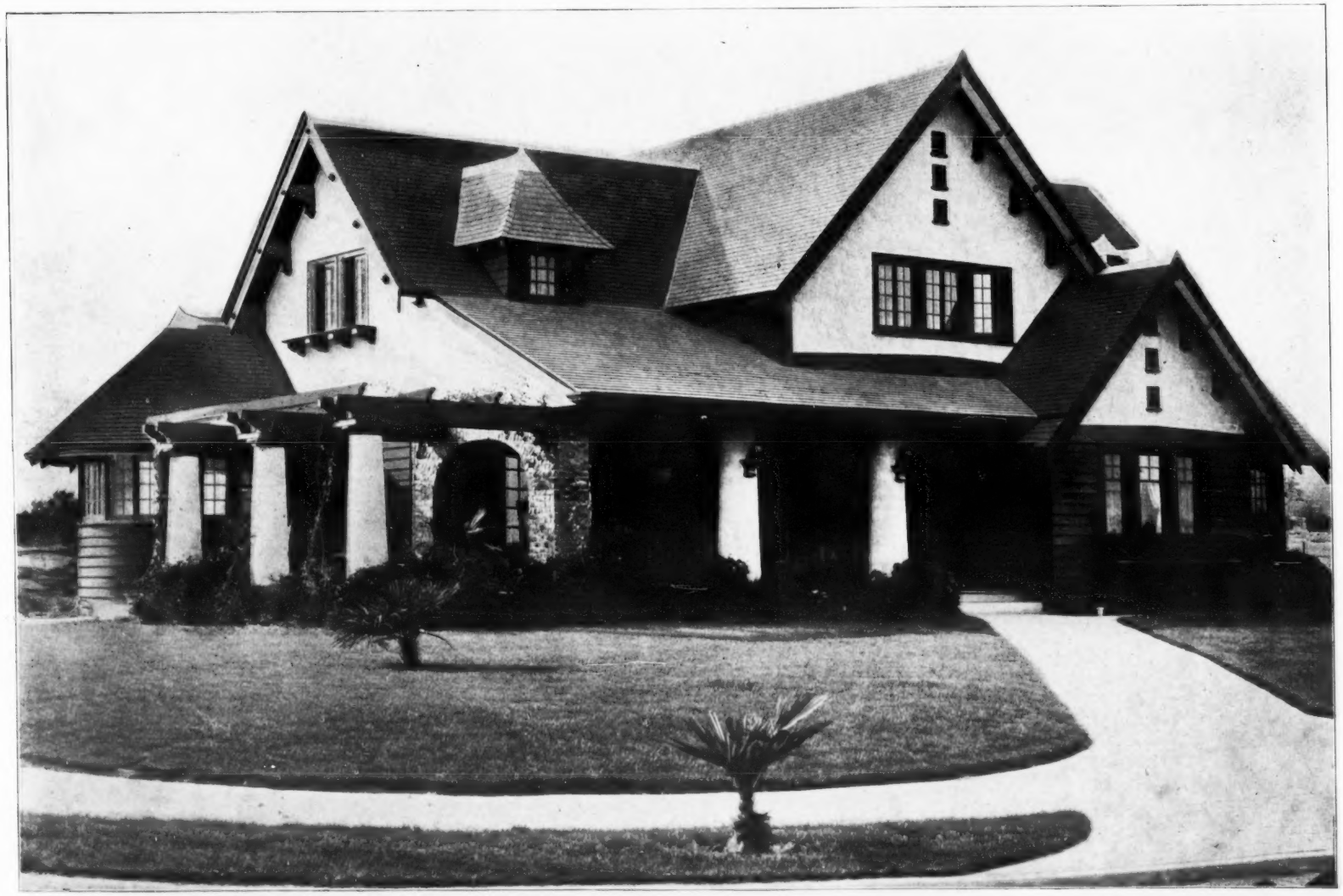

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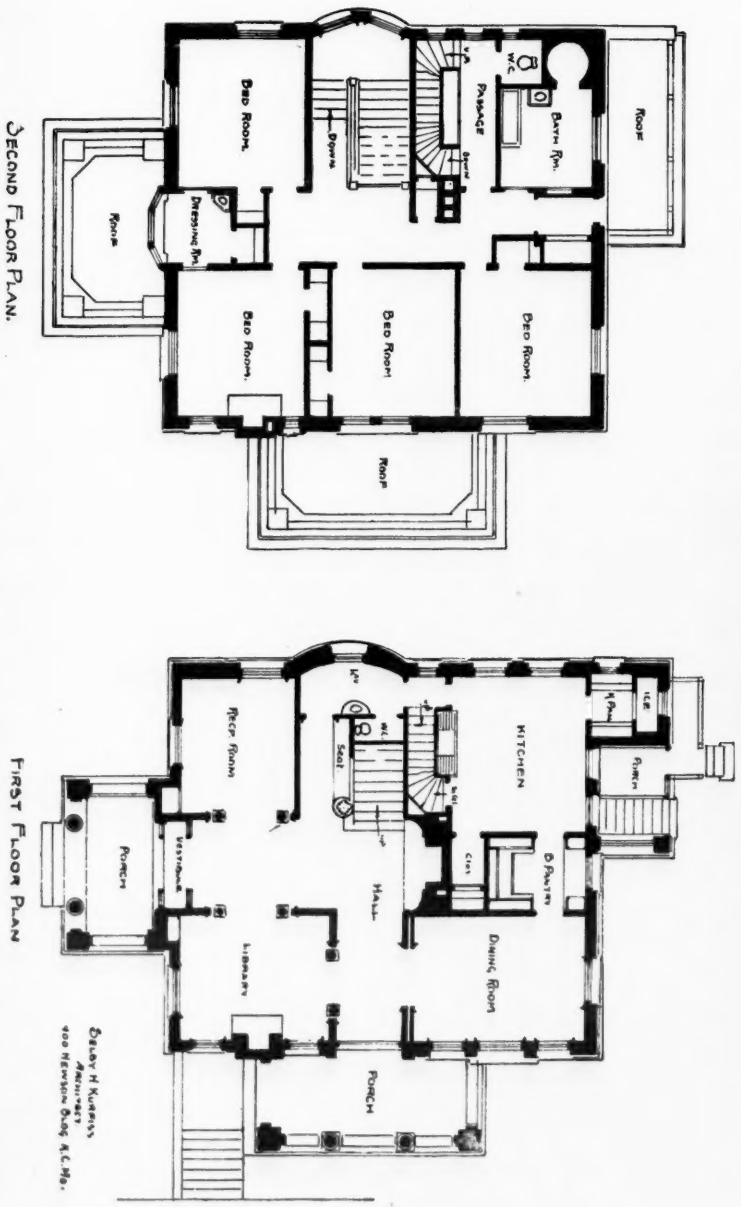

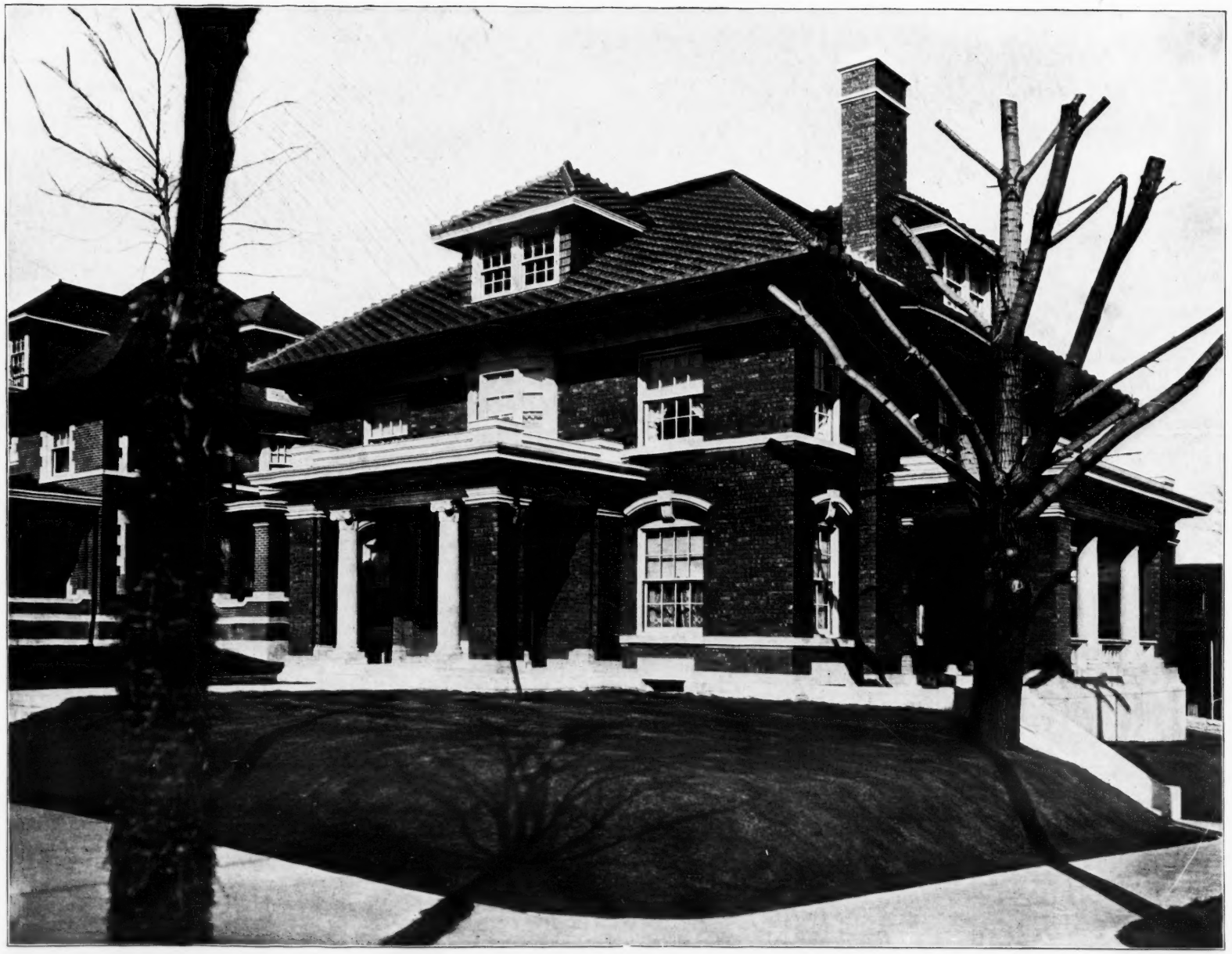

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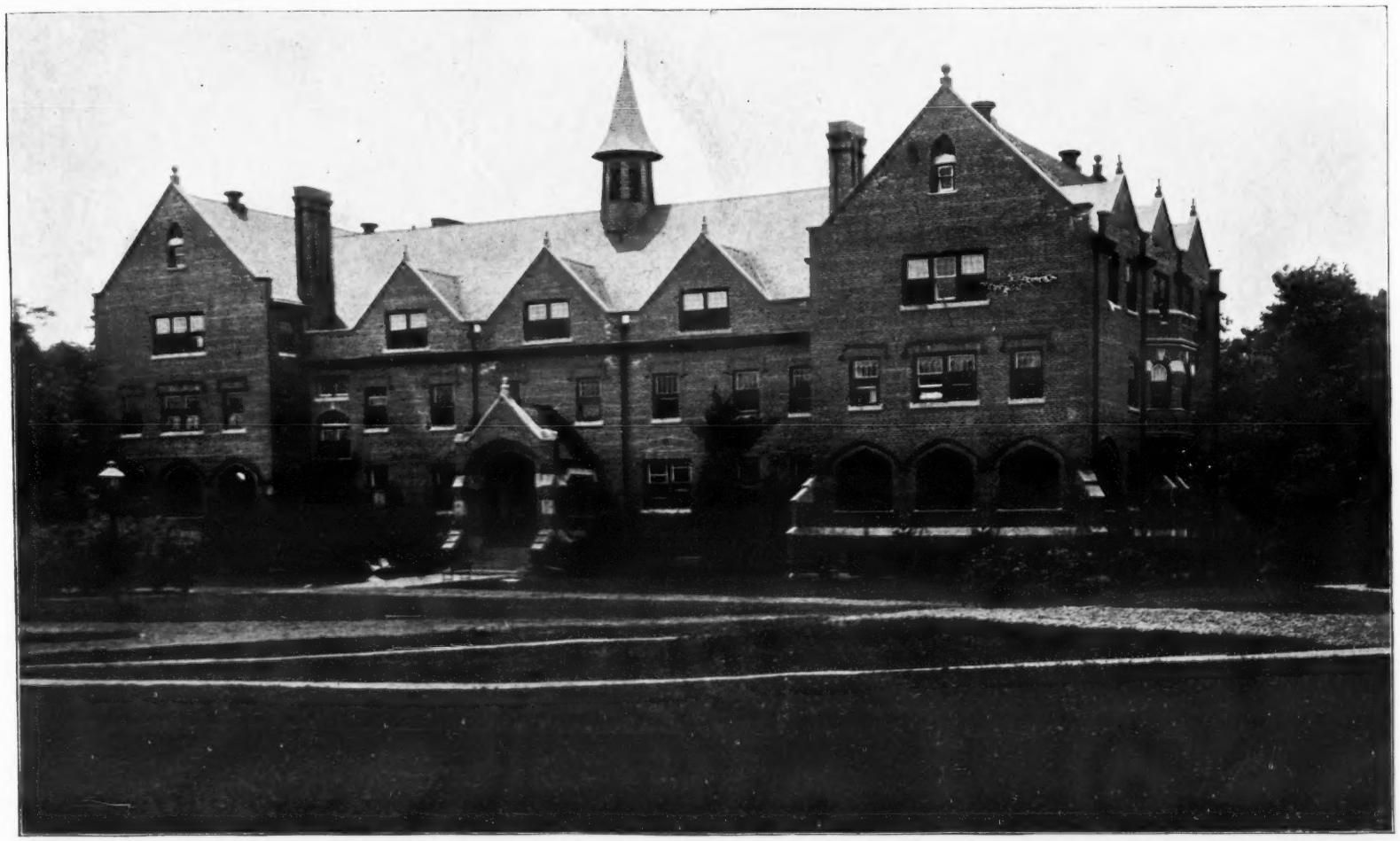

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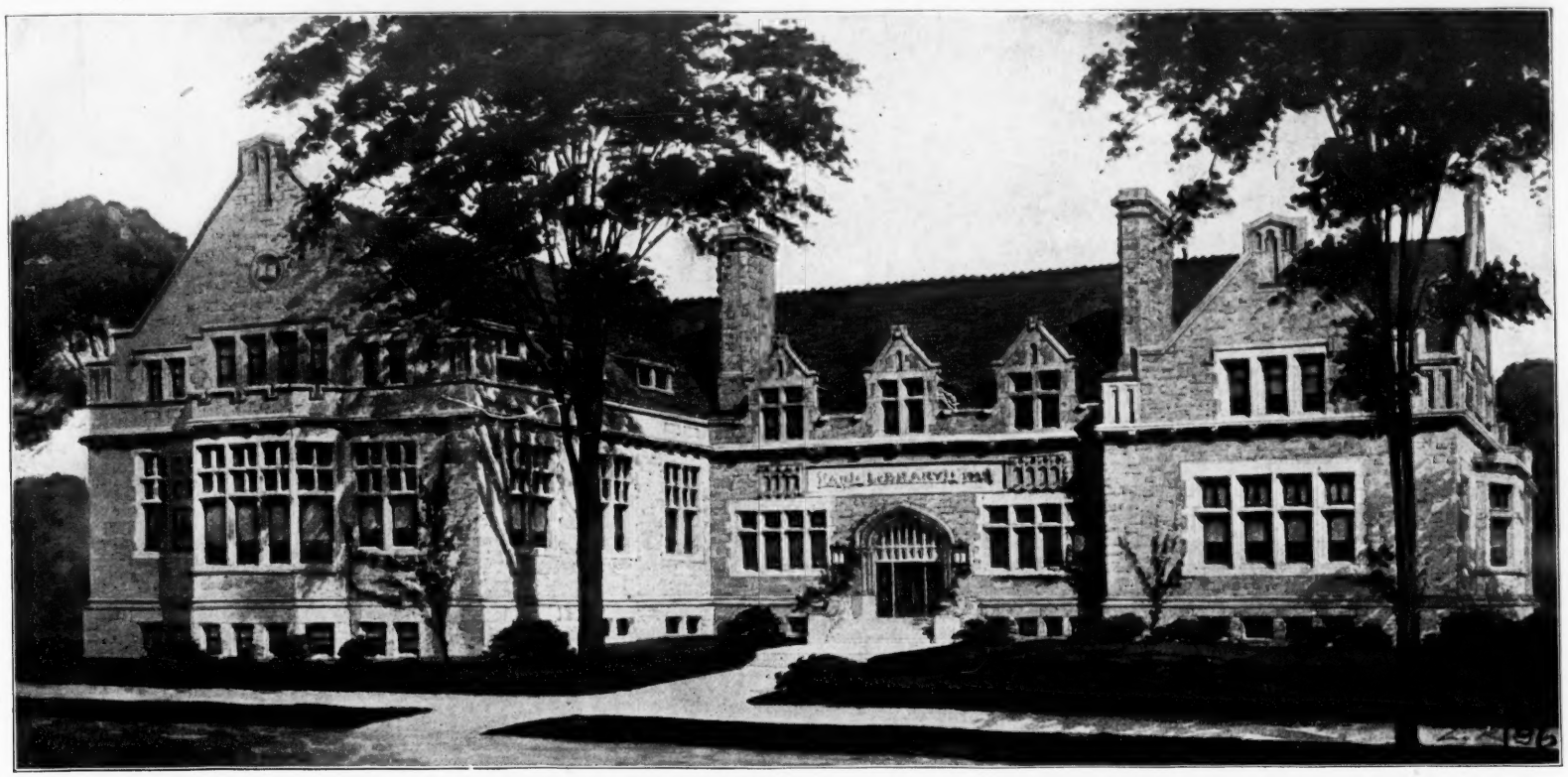

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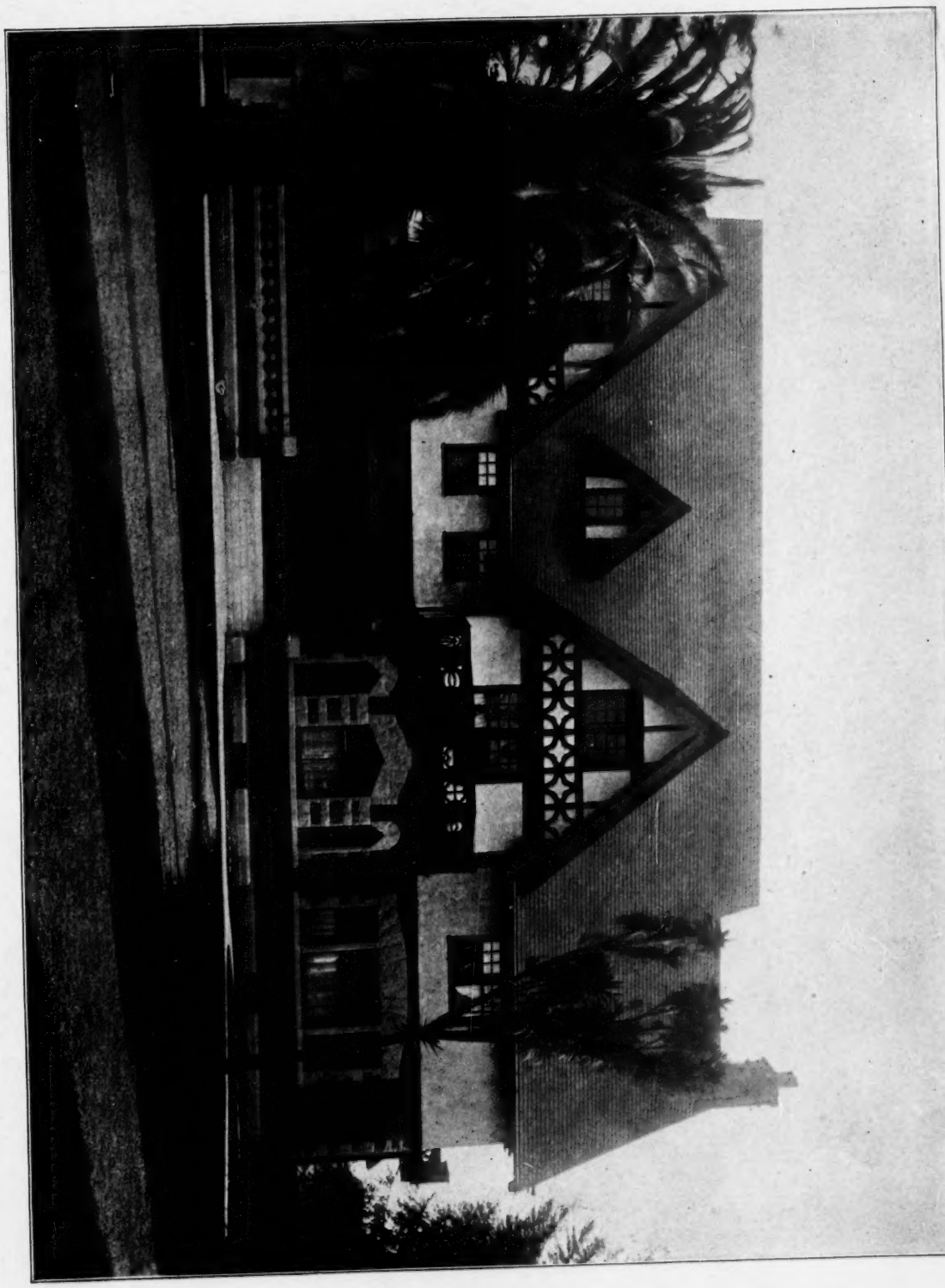

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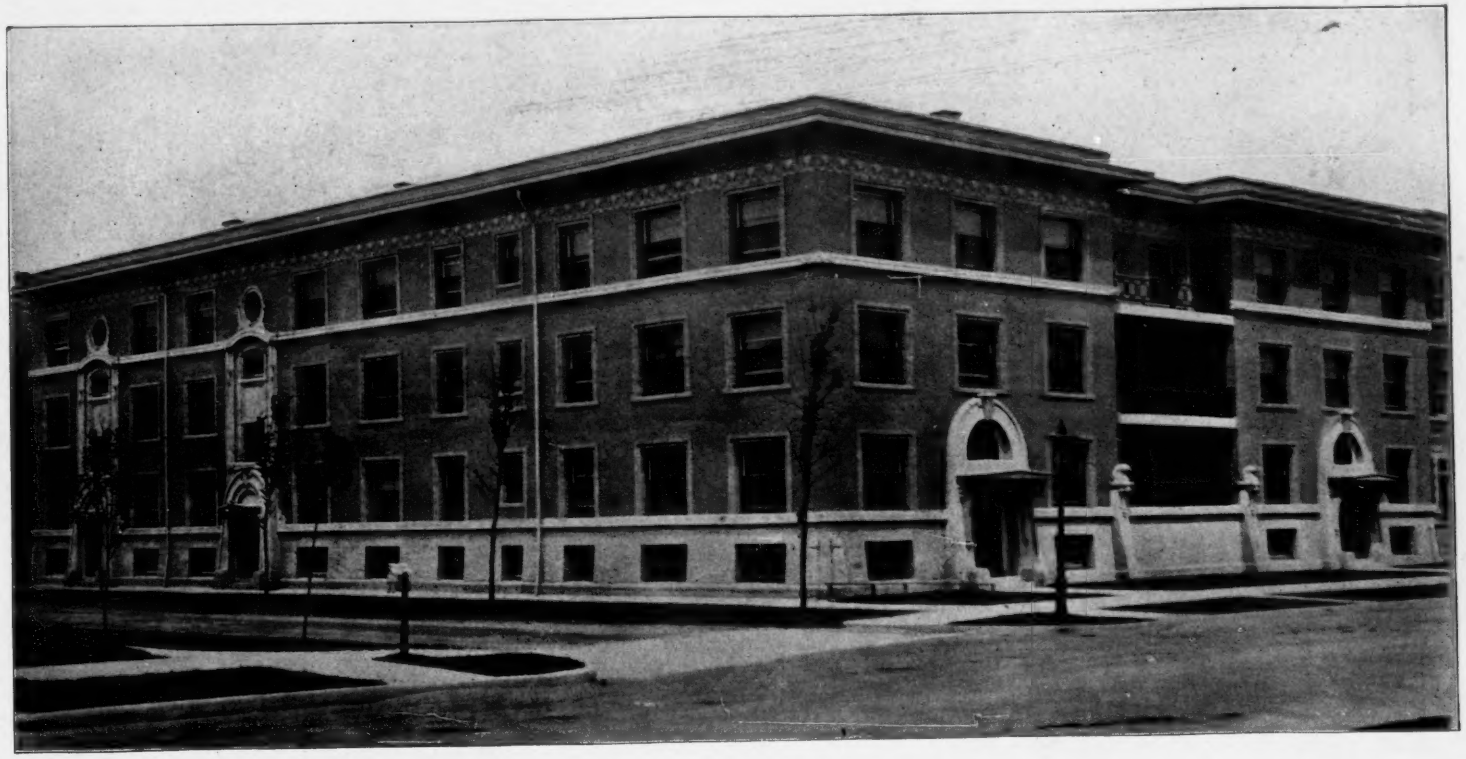


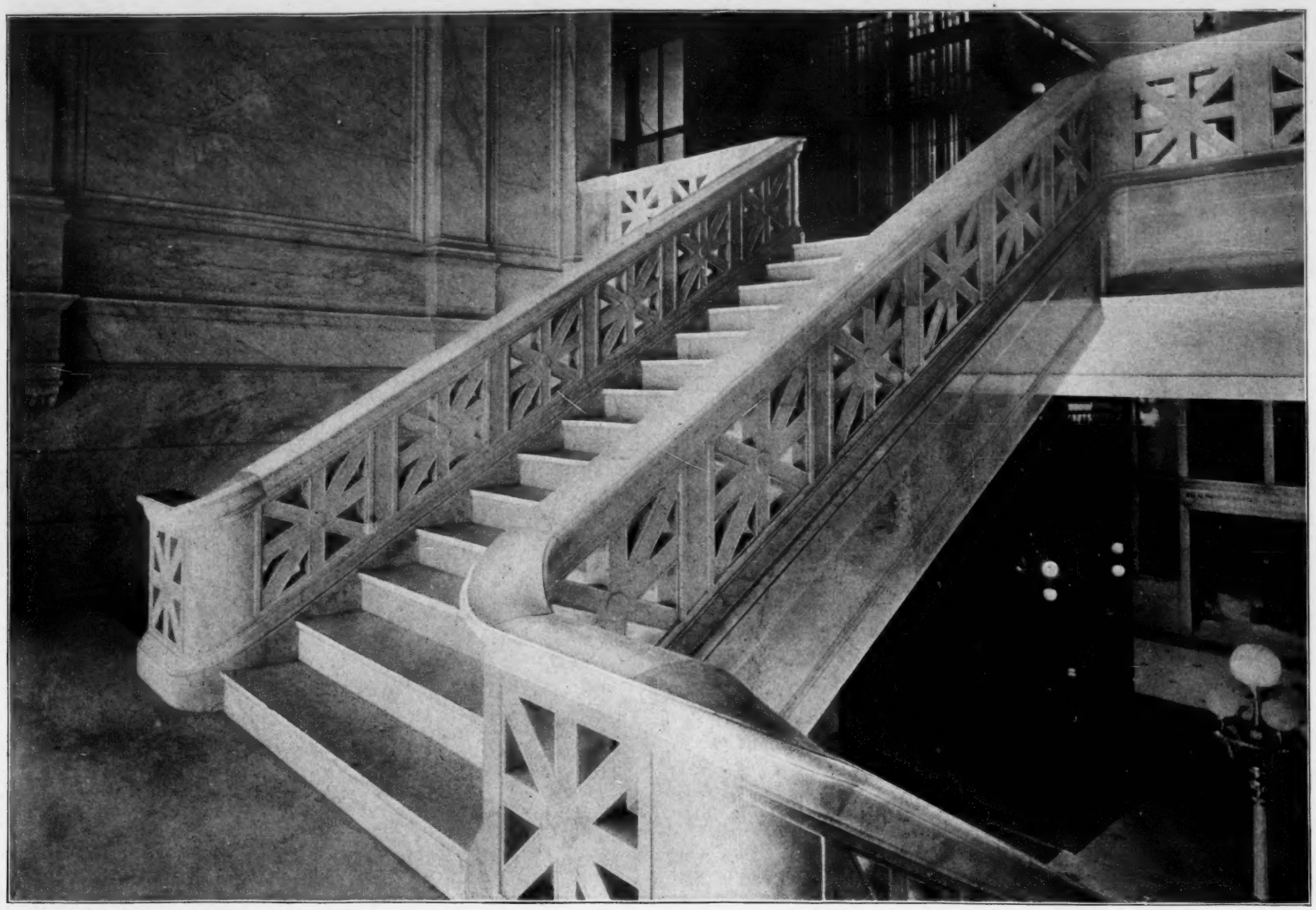
SHERLAND APARTMENT BUILDING, SHERIDAN PARK, ILL.

S. N. CROWEN, ARCHITECT, CHICAGO

Graham Photo Co., Los Angeles, Cal.

HERMAN W. HELLMAN BUILDING, LOS ANGELES, CAL.

A. F. ROSENHEIM, ARCHITECT



Graham Photo Co., Los Angeles

GRAND STAIRCASE

HERMAN W. HELLMAN BUILDING, LOS ANGELES, CAL.

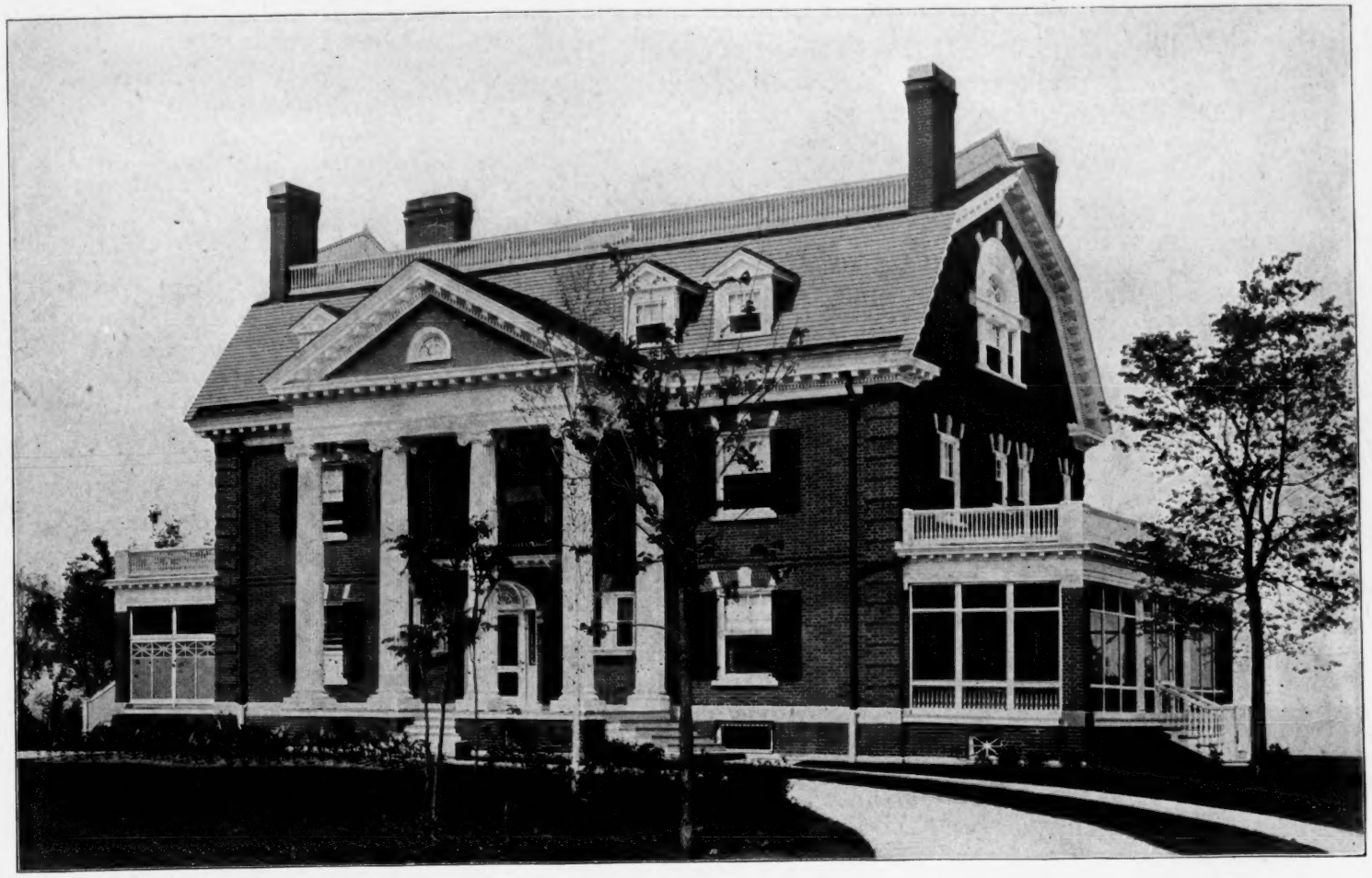
A. F. Rosenheim, Architect

Graham Photo Co., Los Angeles.

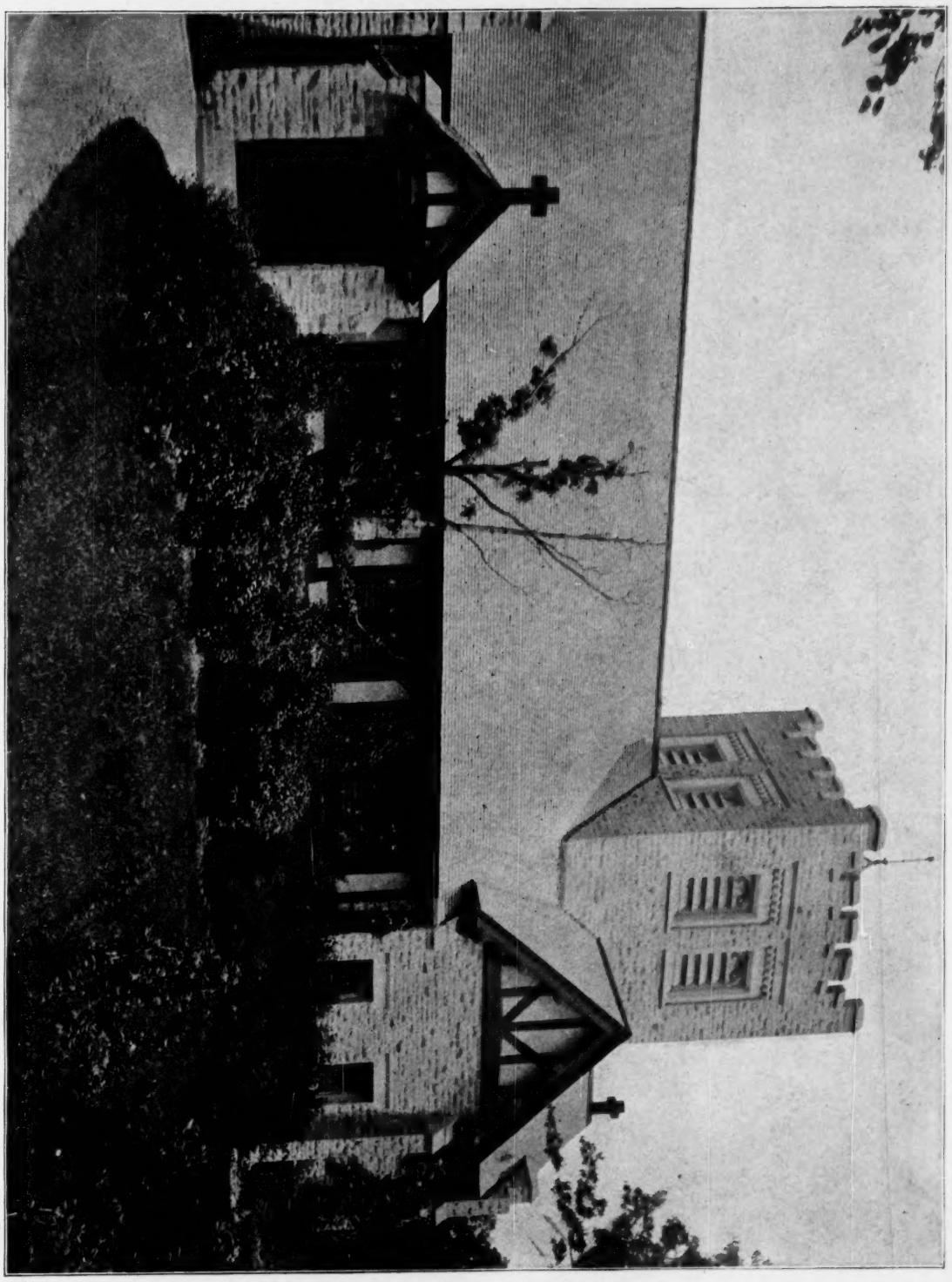
MAIN CORRIDOR

HERMAN W. HELLMAN BUILDING, LOS ANGELES, CAL.

A. F. ROSENHEIM, ARCHITECT



RESIDENCE OF F. O. MAGIE, WINNETKA, ILL.
J. C. LLEWELLYN, ARCHITECT, CHICAGO



CHURCH OF THE HOLY SPIRIT, LAKE FOREST, ILL.

FROST & GRANGER, ARCHITECTS, CHICAGO

Mr. Putnam invites the further coöperation of his fellow architects and engineers and of boards of health in the endeavor to place these ordinances on a more scientific basis, and will suggest that commissions be appointed to investigate judicially and impartially the entire subject of plumbing legislation. If it is true that the public are paying twice as much for their plumbing work as is necessary and obtaining as a result only greater and greater *insecurity*, the sooner the facts are known the better. The cost of such an investigation by a state or national commission of experts, which would settle the matters in dispute permanently and for all the cities in the country at once, need not exceed that of the unnecessary piping and trapping, if Mr. Putnam's contentions are sound, in a single large office building.

Foes of the Skyscraper Vanquished

With the introduction in Chicago some twenty years ago of the type of building known as the skyscraper, engineers and architects faced many new problems in construction and had to devise protection from new dangers to safe building. From the isolated pier foundation with its strength scientifically adjusted to sustain its individual load, the course has been to the present day concrete pile resting upon bedrock, by which all possible danger by the corrosion of iron and steel weighted foundations is overcome. Not only is extreme care taken to prevent corrosion of all steel and iron used in the huge framework of the building by coverings practically impervious to moisture, but a great factor of safety is calculated in provision against vibration by which movement under the highest winds if not entirely prevented is reduced to such a minimum as to be of little consequence. The most advanced electrical science has been drawn upon to prevent danger to the steel skeleton from electrolysis by perfect insulation and avoidance of possible leakage. The lessons of the fires to which these high buildings have been subjected have been so carefully studied by the experts in fireproof construction that the building of today has many safeguards against the fire foe that were not known or regarded necessary in the earlier structures. It is possible that the skyscraper is destined to encounter peril from conditions not known to present day science, but as now constructed their permanence is assured against all known dangers.

Hollow Concrete Building Blocks

For the past few years the architects, especially in the West, have had urged upon their attention the hollow concrete building block for entire buildings of all classes. Few architects as yet have been called upon to design structures of this material, but its manufacture is developing so rapidly that the profession should lose no opportunity to thoroughly investigate the subject. The days have passed when the chief argument in favor of the use of this material was that it was a good imitation of stone at a low price. Today the hollow concrete building block is offered on its merits as a building material in competition with wood, natural stone, hollow clay blocks, or iron. There is scarcely room to doubt that this material can be made so that it will meet all practical requirements as to non-absorption of moisture, compressive strength and great resistance to fire; also, it can be given any variety of color, and be hand dressed to any desired surface. To retain a permanent market for these blocks the progressive manufacturers interested are fully aware that there must be established a high standard of quality acceptable to the insurance interests, municipal building departments and to the architects; and that all blocks that do not conform to this standard must be condemned and discarded. While official tests of the severest character are now under way, and the results will be published at no distant day, sufficient tests already have been made to establish the fact that manufactured with proper care and intelligence hollow concrete blocks are a valuable building material, combining low cost, strength, durability and fireproof qualities of high degree.

Labor Disputes and Use of Concrete

Curiously enough labor disputes have been, perhaps, the most efficient factor in bringing concrete again into use among building contractors. The stone masons, who had formerly almost a monopoly of the business of constructing foundation walls, have not always, as it seemed to the contractors, been perfectly reasonable in their demands, and the quarrymen, without whom their work could not go on, were even more liable to misunderstandings with their employers. At last the latter, in despair at the losses to which they were subjected by alternate strikes in these two trades and encouraged by the reduction in cost of cement, began to turn again to the use of concrete, not only for footings, but for foundation walls. The ordinary contractor's concrete of ten or fifteen years ago would have been a very unsuitable material for retaining walls, on account of its inequality of composition, due mainly to bad mixing; but good concrete is a very different affair, and, under the stimulus of self interest, contractors have studied the subject until careful and intelligent preparation of the materials, aided by the well designed mixing machines now available, has so far taken the place of the ignorant methods formerly in use that reasonably good concrete for foundations can now be had anywhere at a price which compares favorably with that of stone work.

Considering the superiority of good concrete over stone work in the qualities required in foundation walls, in resistance to the pressure of the earth, in imperviousness to moisture, and in the smoothness of the inner and outer surfaces, there can be no doubt that the new material will be more and more extensively employed and that the characteristic ingenuity of Americans will adapt it to an increasing number of uses. Already building blocks of concrete, made on the spot by portable machines, have come into use in many places, instead of brick. Being molded with hollow spaces, they make a light and non-conducting wall, as well as a strong and impervious one, and seem destined not only to take an important part in American construction, but to influence the artistic development of American architecture which can not be more fruitfully employed than in adapting design to new materials.

SANITARY ENGINEERING IN THE MODERN OFFICE BUILDING.

BY J. PICKERING PUTNAM, ARCHITECT.

In treating the subject of sanitary engineering for the readers of THE INLAND ARCHITECT, I find it necessary to call attention at once to the fact that science and practice in this domain are, in the most vital particulars, directly at variance with one another, and that consequently nearly every detail depending upon these fundamentally conflicting main principles must be examined critically and independently from the start.

The plumbing laws operative at the present time in most of the principal cities of the country are based on the ideas of more than a decade back, and, as governing the general practice of today, are, like it, directly opposed to the actual demonstrations of science and to the teachings of acknowledged modern authorities.

Hence the only possible way to present anything of the least value in this most important department of architecture is to break entirely away from the conventions of ordinary practice and base all our conclusions upon direct personal investigations and absolute demonstration. Our treatment must therefore necessarily become largely critical and argumentative throughout, and, although this method of handling the subject is certain to arouse from many quarters adverse criticism and possibly some bitterness, it is nevertheless evidently unavoidable, and will also have the great advantage of making the matter vastly more interesting and we hope much more intelligible to the reader.

It is also useful and gratifying to record here that some of the more progressive cities are becoming independent enough to adopt these more modern and scientific principles, and are simplifying their ordinances and requirements along nearly all the lines which will be found advocated in these articles; and the author takes this occasion to refer with great satisfaction to letters from the heads of boards of health of many large cities, and from leading architects and engineers, endorsing most heartily his conclusions, inviting his suggestions for the revision of their local plumbing laws (a copy of one of which will be presented at the end of this treatise), and in return proffering aid and encouragement in the dissemination of these views tending toward the adoption of more rational and simpler plumbing construction.

Looked at from the standpoint of the modern office building it may be said that the rolling mill is coöperating with the microscope in revolutionizing the practice of sanitary engineering.

To the latter we owe discoveries in bacteriology which have, almost within the last decade, sufficed to fundamentally alter our views as to the nature and proper treatment of sewage; and to the former the astonishing development of the modern "skyscraper" which is doing much to open our eyes to the absurdity of the old ideas and methods of plumbing.

Fig. 1 shows for illustration a plumbing stack in one of these twenty- or thirty-story office buildings constructed after the requirements of the present faulty laws; and Fig. 2 shows the same fixtures plumbed in accordance with the teachings of modern science.

I propose to call attention briefly to some of the most serious defects of the first arrangement, and later to examine them more in detail, and review the demonstrations upon which we have based our preference for the second and simpler system.

The office building illustrated is provided, as is not uncommon, with a restaurant, kitchen and caterer's or caretaker's living and bath rooms in an upper story.

The present laws in most cities, in the first place, still insist upon the use of fully double the amount of piping and labor required for producing the best results. The trap of every fixture must be "back vented" by a special air pipe extending practically from basement to roof, and in order to offset as far as possible the effect of friction, this special air pipe must be rapidly increased in sectional area as it ascends toward the roof. It is beginning to be understood by the public that the element of friction against the walls of this enormously long "back vent" pipe plays an extremely important role in nullifying whatever usefulness it might otherwise have as a protector of the trap seals against siphonage, and that, on the other hand, this same exaggerated length increases proportionally the rapidity of the air current it conveys over the trap seals, and correspondingly the speed of their destruction by evaporation. Thus the "back vent" pipe introduces a new danger far greater than the one it was erroneously expected to remove.

It is now known that ordinary "round" or "pot" traps of large diameter are practically proof against siphonage and that they may be kept thoroughly scoured and aërated by simple unpatented flushing devices, so that not even the shadow of an argument exists any longer for the evil of "back venting." The simple system shown in Fig. 2 has been proved to afford absolute security.

We see in Fig. 1 some of the many ways in which the back vent pipe fails in practice. Clogging with grease is shown over the sink trap in the top story and is known to be very common.

At every quick bend under a long vertical run of iron vent pipe rust is certain to collect in large quantities as shown in the basement. A comparatively small amount of flaking off of rust or sediment in such a place may suffice to destroy the efficiency of the pipe.

Sagging, as shown higher up in the tenth story, is another frequent cause of failure. Water and sediment collect in the sagged portion, and failure is the result. Finally *hoar frost and snow* often close the upper opening of the pipe above the roof, producing again failure. The main soil pipe can not be closed with frost at the top when the main house trap is omitted because the warm air of the sewers will then constantly rise through the pipe and be able to melt the accumulation as fast as it could form. But in this antiquated system of piping the very best opportunities for ventilation are obstructed by useless trapping.

The chances of leakage in the back vent pipe are evidently increased in proportion to the increase of piping, and, what is more important still, no water flush passes through the vent pipes, and there is consequently nothing to announce to the eye the presence of leaks, which may therefore do their mischief before they are discovered.

A drawing somewhat like this was used to illustrate a paper on trap ventilation I read some time ago before the Boston Society of Architects. The society then voted unanimously to make an effort to have the back vent law

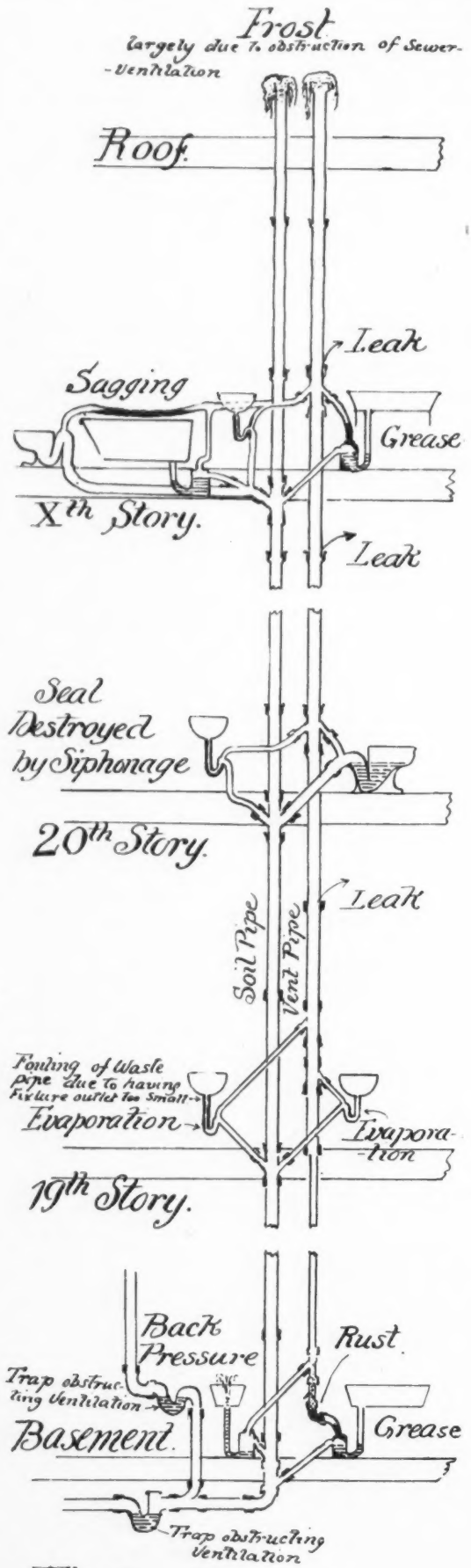


Fig. 1 Present Unscientific and Unsafe Method.

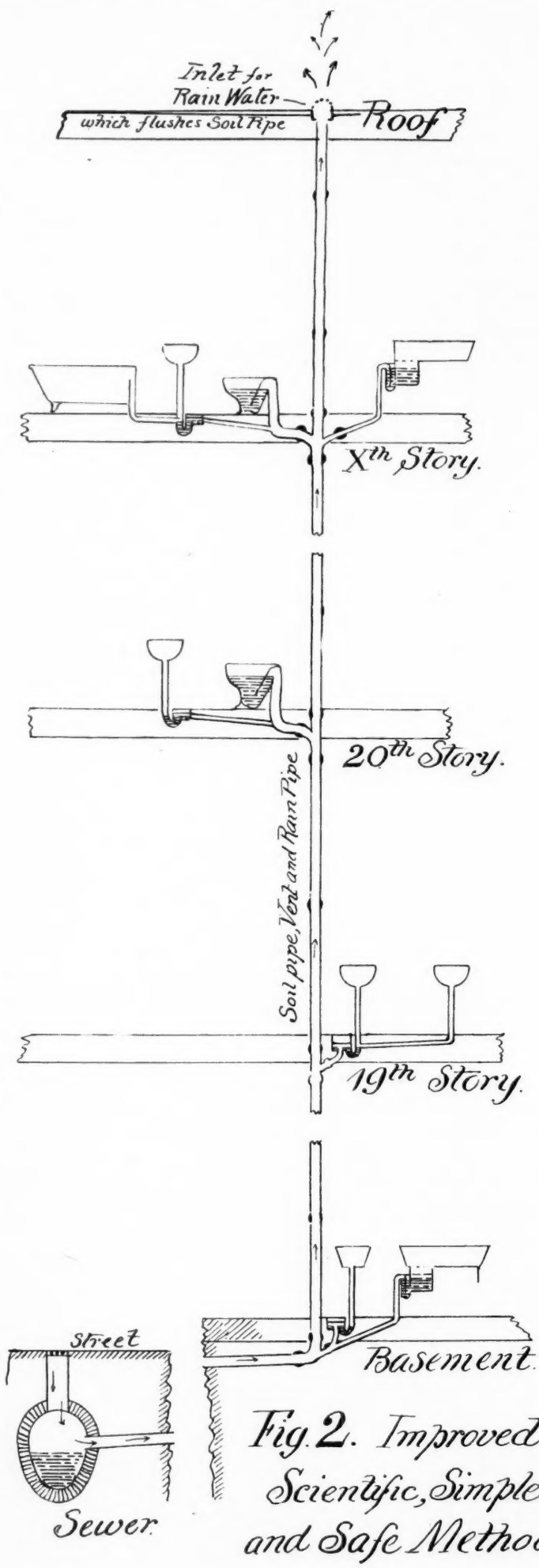


Fig. 2. Improved Scientific, Simple and Safe Method.

repealed. A committee was appointed and counsel employed to attend to the matter. The efforts of the society, however, in this direction have not as yet met with success, and they have not as yet ascertained with entire certainty from what source the opposition came.

In the second place the old plumbing ideas and the laws resulting therefrom which are still enforced in many cities, require every building to be disconnected from the street sewer by the use of the so-called "main house" trap or "disconnecting" trap in the basement as shown in Fig. 1. This law originated from the erroneous idea that disease germs are disseminated through the sewers. The science of bacteriology has recently demonstrated that germs, being "particulate," are, like other particles of organic matter, caught and held by the water and damp surfaces of sewers when they enter them from the air; and that the germs of specific diseases are moreover quickly destroyed by other bacteria in the sewage, which are harmless to man, and that the air of sewers is therefore practically free from germs of disease, and is not a source of danger in this respect. It has been clearly proved that such germs are disseminated through the air of the streets above the sewers rather than through that of the sewers themselves, and that, accordingly, the main purpose for which the "disconnecting" trap was originated never really existed at all except in the imagination of the originators. We shall treat of this in greater detail hereafter.

Ill ventilated sewers do, however, generate foul odors from the decomposing organic matter which they convey, and these odors are not agreeable to inhale, nor are they wholesome when concentrated or continuously breathed. When thus inhaled, they have the effect of predisposing the system to injury from disease germs which may enter the system from any source.

The argument is, therefore, often advanced in favor of the intercepting trap that it excludes from the house these foul odors of the sewers.

This argument is, however, also fallacious, since the introduction of the intercepting trap at each building destroys the only practical and effective method now known of ventilating the sewers and rendering the air within them absolutely innocuous. Hence this trap becomes the sole creator of the nuisance it was designed to prevent. These arguments will be fully substantiated hereafter.

In the third place the old ideas and plumbing laws limit the jointing of cast-iron pipes to lead calking. Probably no more unscientific method of construction now exists in the whole domain of house building than this, and the tall office building is showing us the reason why this is so. The longitudinal expansion of a line of soil pipe two or three hundred feet high is often sufficiently great, when hot water from a bath tub or sink is allowed to run through its entire length, to open the joint or break a connection with a fixture.

The joint is rigid and expensive where it should be flexible and economical.

Other really scientific methods of jointing cast-iron pipes have recently been devised which are both reliable and flexible and much cheaper than the lead-calked joint as will be later shown and the continuance of this law on the statute books is no longer justifiable.

In the fourth place the present plumbing regulations make no provision for thorough water flushing of traps and waste pipes. The laws should provide that all fixtures should be constructed with outlets large enough to fill the waste pipes "full bore," and all sinks should be constructed on the principle of an automatic flush tank. This simple provision would add little or nothing to the expense and remove the last argument in favor of the very expensive system of "back venting."

Many other important changes in the present laws are necessary to attain greater safety and simplicity, and these will be discussed in another number.

RECENT IMPROVEMENTS IN BUILDING.

BY T. M. CLARK, ARCHITECT.

PERHAPS none of the developments of modern life have attracted so little attention, in comparison with their extent and importance, as the modifications in the art of building which have been made in this country within the last twenty years. To the public, improvements in building methods are practically unintelligible. Provided the outward appearance of buildings remains approximately the same, the most radical changes in methods of construction are unnoticed by the ordinary spectator; and even novelties in appearance do not suggest to the layman, as they do to the architect, corresponding novelties in structural methods. While, therefore, the attention of the great majority of people is never called to the technical features of the buildings in which they work and live, that of architects, always concentrated upon improvements to be made on existing methods, soon loses sight of everything that has been superseded; and, while it maintains an admirably clear view of current practice, avoids, as interfering with this, anything like a historical picture of the steps through which the current practice has been developed; so that, unless they have had special occasion to reflect on the subject, the people who are likely to be most surprised to find how rapid and how profound have been the changes for the better in their art within half a generation, are those to whom the improvement has been mainly due.

Of course, the most important of these changes has been the general adoption of the steel frame for buildings; but the steel-framed structure of the present day differs as much from that of twenty years ago as that which we use today will probably differ from the structure of twenty years hence. Not only in methods, but in material the art of construction in encased metal has advanced with a rapidity which it is difficult to realize. Considerably less than twenty years ago the present writer had charge of the construction of a building in which steel beams were used. At that period, while iron beams had, of course, long been familiar to architects, structural steel was almost a novelty, and a very doubtful novelty, at best.

Strange stories were told of the new material. In one case a steel beam was said to have snapped across the middle on being unloaded from a wagon; and, while the writer did not, in his own work, observe any phenomena of this sort, the men who drilled the beams for the connections complained that some of them were soft at one end, but so hard at the other that the drill would hardly touch them. It is scarcely necessary to say that standard connections, and members ready punched and

reamed for the rivets, were then almost unknown in building work; and the architects who have practiced steel construction from the beginning can best appreciate the perfect and uniform metal, the simplified and standardized articulations, and the admirable system of fitting and preparing, which a few short years have now brought into universal use.

So far as the metallic part is concerned the present standard steel frame for buildings leaves little to be desired, and is not likely to be greatly modified; but there are many indications that the design, the material and the construction of the envelope in which it is encased will be, in the more advanced and logical buildings, profoundly changed before many years; and the steel-framed structure of the next generation, whatever its internal skeleton may be, is likely to have very little external resemblance to that of today. Up to the present time, however, the improvements in modes of casing the steel structure, although important, have not been very apparent to the uninstructed observer, and only the professional man can fully realize how far superior the well bonded and grouted mass of masonry encircling the steel members of a modern structure, is to the disjointed composite of piers and panels, insecurely balanced on angle-iron shelves, which was too frequently to be seen a decade or so ago.

It is not alone in the skeleton of a modern building that the last decade has brought improvement. While the terra cotta floor filling, with some advantageous modifications, still holds its own against the various combinations of metal and concrete which seek to drive it from the field, concrete in other forms is winning an undisputed place in this country among building materials of the highest value and importance. The architect of the present day, using thousands of yards of Portland cement concrete every year for foundations, building blocks, floors, steps, sidewalks and a score of other purposes, recalls with difficulty the period, much less than twenty years distant, when Portland cement was, in this country, a costly and uncertain material. At that period German Portland cement, excellent and uniform in quality, was available for those who were willing to pay from three and one-half to four dollars a barrel for it; and various singular compounds, under the name of English Portland cement, were in the market at a somewhat lower price. These cheaper cements, however, as imported into the United States, had some extraordinary qualities. One of these was the property, possessed by many samples, of expanding preposterously on setting. That was the era of the pretty, but evanescent, fashion of carving brickwork, and the ornamented facing, which was generally laid in Portland cement, to enable it to resist the carving tools, not infrequently came off the wall in patches soon after it was completed, in consequence of the expansion of the cement in which it was laid. Architects, who use comparatively small quantities of certain materials, are often obliged to take what they can get, rather than what they would like to have; and it was then a common practice in the profession to test the costly cement offered them by putting some of it into a bottle, with a little water, and leaving it for a day or two. If it did not expand so much as to break the bottle, or contract to a startling extent, it was pronounced fit for use; but, even then, careful architects, following the English fashion, usually exposed the cement that they intended to use to the air for several days so that it might get through its shrinking or swelling before it was employed in the building. Troublesome as these precautions were, they were very necessary, and the recollection of them should make us grateful for the admirable American Portland cements which are now offered to us on all sides, and for every purpose, at one-third the price which was demanded fifteen years ago for imported cements in every way inferior.

In the mixing and handling of cement concrete, also, the practice of the present day in this country is far superior to that current even a very few years ago. It is true that competent architects and engineers, as well as the artificial stone manufacturers, the granolithic workers, the tile-layers, and other trained experts in cement work, have long understood how to select their materials with good judgment, and to mix them skilfully; but even among these the delusion of the superiority of the "second set" of Portland cement lingered until quite recently; while until within five or ten years, the notions of the ordinary builder in regard to the manipulation of concrete were much worse than vague. A certain New York contractor is said to have built his concrete foundations by filling the trenches first with broken stone, on top of which sand was dumped, followed by a layer of cement emptied from the barrels upon the heap, the process being completed by washing down the mass with a hose, under the impression that the materials would, in some wonderful way, stick together. The writer, some fifteen years ago, was called upon to strengthen the foundation of a large building, which he did by inserting under them a sheet of ten-to-one concrete. The manufacture and application of this concrete excited great interest among the builders and masons of the neighborhood, who watched the process with incredulous smiles, expressing freely their opinion that such "poor stuff" would crumble to pieces as soon as the inclosing planks were removed. When the planks were actually removed, and they tried to break off a corner or edge of the concrete, their scorn for it was turned into veneration, and concrete underpinning took its place in their minds as a resource of almost miraculous value. It was not long before they tested it for themselves. A building in the vicinity of that previously operated upon had settled, in consequence of deficient foundation, and an ingenious builder took it in hand. To support the structure on shores, and excavate beneath the footings for the purpose of inserting sheets of concrete, seemed to him, apparently, unnecessary with so marvellous a material, and he contented himself with digging holes at intervals beside the foundation walls and dumping a dose of concrete into each, in the conviction, as his foreman explained, that the concrete would "adhere" to the old walls and in some mysterious way prevent them from settling further. His anticipations were probably not realized, for no further use seems to have been made in that locality of this form of concrete "underpinning."

IT IS reported that an additional story is to be added to the so-called "Flat Iron Building" in New York. It will be constructed of angle iron and terra cotta blocks and be occupied by the drafting room of the building company which owns the building.

MUNICIPAL IMPROVEMENTS.

BY ALBERT KELSEY, ARCHITECT.

IN undertaking to contribute from time to time a paper upon municipal improvements it is well to introduce the series by a brief review of some of the forces now at work along these lines in the United States.

Our cities, for the most part, are truthful expressions of their inhabitants. They represent hives of industry rather than peaceful resorts. And all the hurry and lack of repose for which we are noted abroad is manifested along our congested thoroughfares. Few have a Champs Elysée or a Prado—that is, a place where everyone goes to see and to be seen. And fewer yet have their public buildings displayed to advantage in an ample setting with radiating streets focussed upon them to add to their dignity and importance.

None have their water fronts massively and permanently treated so that their rivers scour themselves clean, and so that their sea walls present an inviting appearance. And perhaps Harrisburg, Pa., is the first to erect a formal and dignified gateway through which to welcome her guests. True, several cities have recently built, and others are now building, noble stations with ample squares in front of them to provide for the accumulated traffic they attract, but as yet a city gateway like the Barriere du Trone at Paris and the water gate at Bordeaux are municipal luxuries for which we have not yet had even time to pause and consider.

Every architect is conscious of the disgraceful character of most of the bridges in our cities, though some may not be familiar with New York's admirable start, which provides for the colaboration of a skilled architect in the designing of all future bridges.

Two conditions largely account for the backwardness of our cities' physical development. They are, first, their vast area, frequently out of all proportion to population, thus necessitating cheap and often temporary forms of construction; and second, political corruption. One or the other of these conditions usually offers an overwhelming argument against giving attention to artistic treatment. Reformers see only more temptations for the grafters and the grafters see only restrictions in any enlightened readjustment of the present haphazard scheme of development. Thus it happens that we have a most difficult task before us and yet in the light of what has already been achieved, as is presently to be seen, there is no occasion for feeling downcast, but on the contrary there is every reason to believe that we are now entering upon the most comprehensive, and possibly the most enlightened, era of city making the world has ever known.

True, none of our cities yet have departments of municipal extension, as they exist in most all of the cities of the first, second and third class in Germany. A public office where all contemplated improvements are carefully studied from every known point of view concerning the general welfare, by a board of specialists representing several professions, before the proposed work can be authorized; but with the amazing rapidity with which we adopt new ideas it is not to be doubted but that this bureau will be added to our departments of public works before many years.

The city engineer is already recognized as an overworked official. Throughout the land special commissions are appointed, who in turn employ specialists, to help him in the solution of special problems; and now we come to a consideration of this talent.

Who are to be the Haussmans and the Alphards of the twentieth century in the United States? Many unfortunate young people (both masculine and feminine) have recently manifested the most violent symptoms of "landscape architecture." In many cases their disorder (judging by results in their various spheres of influence) can be traced to no early training, nor to any form of higher knowledge—their ailment often appearing to be a case of acute ignorance. The writer does not refer to the horticulturalist and the rural landscape designer, whose services have happily been widely recognized of late, nor to the valiant workers in hundreds of improvement societies who are doing so much to stimulate civic pride and to impress civic obligations upon property owners, but he does refer to that something or other, often miscalled "landscape architect," who offers to beautify anything from a back yard to a city, while you wait.

A generation ago it is true the architect was also more or less of an unknown quantity and that is the state of affairs today with the equally noble profession of landscape architecture.

What is a landscape architect? There are so few as to make it both dangerous and impertinent to attempt to answer the question by pointing to the work and careers of any man or group of men now alive in the United States. While to mention only the name of the late Frederick Law Olmstead calls attention primarily to the genius of a landscape designer. In referring to his greatest pupil, the late Charles Eliot, attention is, however, called to a great original and fundamental idea which this young man had the ability and opportunity to carry out, and which was inspired by the well known writer—Sylvester Baxter, of Boston.

The idea is known as the Metropolitan Park System and consists in acquiring all water fronts as well as large and remote reservations in advance of population for public purposes. The latter for a chain of engirdling parks to be used jointly by a city and neighboring communities. The Massachusetts, and the first, experiment went even further. It included the protection of distant water sheds and all streams included in the area from pollution. A sewage farm was established and in other ways a broad foundation was laid for the future. Thus it became a much wider problem than the mere reclaiming and embellishment of landscapes. In fact in the initial development of these new public ideas (for as yet it is after all but a wonderfully successful experiment, more or less temporarily treated) the diverse social needs of the people according to original neighborhood wants was taken up in a very broad and far-sighted manner.

The idea has spread. It is being adopted throughout the country. Chicago, in particular, having added to her system numerous "social centers" which surpass as yet anything of the kind yet done elsewhere. Broad and uplifting as the metropolitan scheme is in its social benefits it has not yet reached that finished state where all the faculties of the trained landscape architect must be pressed into service to solve the problem with elegance. It represents only part of the landscape architect's work. The following illustration will support the assertion. The plan of Versailles, Romboillet, or Compiégne or the terraced

arrangement of a score of familiar Italian gardens, will give the reader a notion of the reason for adding the word architect to the well rounded landscape man's title. It will convince him also that park problems with us are still in their infancy. It is in such schemes as these, and they are to be found in the gardens of the Moguls in India as well as throughout Europe, that one finds completeness. It is in just such elements as those that dominate these designs that our work is most lamentably weak.

In short, landscape architecture is out of door architecture and not horticulture. Foliage may be used like any other material to fill in a composition, and while it is well for an architect to be able to be his own engineer, it is not necessary nowadays; likewise while an architect might understand plant life and the nature of soils, etc, it is not absolutely necessary when he can employ a good horticulturalist as easily as the man who now, in common practice, figures out his steel truses and foundations.

The varied demands of the city of the future will surely call for the services of many specialists and probably under the leadership of an architect. For it is the mind that conceives the plan that must direct its execution if the best results are to be obtained. Fortunately as yet this country has not produced a landscape man nor an engineer who can design civic problems as intelligently, considering the problem from every point of view, as our best trained architects. Finally the modernizing of our cities requires great forethought, caution and skill. In the plan for the completion of the national capital the finished work of Charles McKim dominates, while among those appointed to carry out the grouping of Cleveland's public buildings only architects have been employed. With these illustrations representing our first attempts at magnificent civic art already under the guidance of architects, the profession has taken another forward step, and it must soon become evident to all that architects alone have the wide experience, deep knowledge and rare taste which is required to successfully guide the physical growth of that most complex and ever changing accretion—the modern city.

AMERICAN STYLE (CONCLUDED) *

BY TITUS DE BOBULA, ARCHITECT.

Sorry to say it is so. This appreciation is the enamel of civilization, the flower of education, the incontestible sign of a nation's spiritual elevation. Let us understand it, that science can make a man very wise; that commerce can make a man very wealthy, but true education can be reached only through love of art. That nation cannot expect a universal progress which develops only science and commercial instincts and leaves his sentiments and the noblest feelings of his heart undeveloped. While even the pure joys of living cannot be felt by him whose soul will not rejoice in a baby's smile, in nature's bloom and in the artistically beautiful. I will mention only two examples. While I was in the Louvre I sat down in the Gujon Room and enjoyed the beautiful creations of antique art. I looked at the Venus of Milo, at that extremely beautiful statue which once touched to tears the dying poet Heine. A familiar sound touched my ears; it was music to me at Paris—it was the American language. I became enthusiastic; while even in America there are amateurs who will visit Paris, not only for the sake of the Moulin Rouge. I watched the words from their lips. The man said: "Look, look, that is a plaster cast." The woman observing it, said: "Ah, no! That's marble." "Well, I tell you that is a plaster cast." "Why, so it is!" With indifferent faces they went through this treasury worth millions and millions and began to point it out, this is marble, this is plaster cast; again, this is marble; again, this is plaster cast. See, this was in their eyes the measure of art criticism. I can say I felt myself ashamed. Finally when they arrived at the corner room which contains the Venus of Milo, the little woman already from the door exclaimed: "You see it shows from a distance that this is marble"; and he replied: "Even this is not worth anything; she hasn't got any arms." What a different spectacle did I witness in the Luxemburg! I was enjoying the immortal picture of the pioneer of modern painters, entitled "The Harvesters." I was so absorbed perfectly in the colors and power of feeling expressed in this picture. Suddenly I heard behind me, "Look, look, my boy, this is the picture of Bastienne Le Page; that there from Puvis de Chavennes; that little one from Meisonnier, all three are great French artists but I like this Harvesters the best. The master painted a picture, painted the truth. Look only closer; Isn't it as though you stood on the meadow! Just look at that fatigued man who lies with his hat on his face! How sweetly he sleeps!" I turned around and I saw a French workingman in his overalls who conducted his family to the Luxemburg and was explaining to his eldest son. How clearly that man saw, and with what good feeling he judged everything he observed. Just imagine the difference. Can we ever find such a tender artistic feeling in our public? But I do not despair. We are yet young.

It is true that for a successful art an appreciative public is necessary, but it all will come in time. In our own art, in architecture, we have to surmount the same indifference which is prevailing in our society, must educate not only the masses, but even those who call themselves "connoissuers of art". The first condition, however, is that we architects shall lay the foundation of a national cosmopolitan style. Work in it, explain it to the public, and then we can hope to become the standard-bearers of all civilized nations, not only in commerce and industry, but even in art. Wonderfully creative and healthy is the American genius. The nation, a conglomerate of all races, will purify herself and necessarily will become cosmopolitan from a humanistic stand-point, not forgetting, however, that they are children of the land of the Eagle.

I began this paper with the title of "American Style" and finally arrived at the point that it is necessary to create such a style. You will very justly ask me: "Where is the way? How shall we do it?" My only answer is, "Work! put your soul into the work, do not copy, do not make Paris out of New York, don't try to bring the Greek Parthenon to our public squares. You ought not to be taken in by the false idea of a Colonial style. Throw away the wrong notion of a Roman Catholic Gothic or of an Episcopal modern English, but go back there where you can find the aesthetical laws in some kind of a development which is the case with the antique of all the world. Go back to our own archeological excavations of Yucatan and Mexico. Take the architecture of the 18th and 19th centuries of Central America, and the New England States, use them as **only** conditional assistance; use our fauna and flora and textile art of the Indians, which is, in many instances, different from that of other countries for the creation of decorative elements; use the spirit of the Aztec buildings, the receding terraces, for instances, as a healthy and appropriate example of monumentality, and, in rightly using them, never forgetting the ever-existing laws of aesthetics. No building can be designated as a monster of a dreamer's infected brain, as some of the followers of the old schools would like to call us, but it will be one step toward that direction which will bring this mighty nation nearer to her predestined fate. Never forgetting the requirements of today which cannot be solved with the historical schools, and conscientious copies, using all the materials according to their nature; applying symmetry, proportion and direction; creating a decorative style of our characteristic conditions, being all the time intensively chauvinistic; sooner or later we must become the rightful representatives of an international style which, although American in its lines, will nevertheless contain the fundamental princi-

* Paper read at the Convention of the Architectural League of America, at Pittsburgh, Pa, April 17, 1905.

ples of a cosmopolitan art, the name of which, however, will be known by all nations as "The American Style."

(Sources—Hartman, Morris, Hock, Semper, Parsons, Rawlinson, Caithness, Le Plongeon, Raznarok.)

ASPHALTUM AND ITS USES.*

BY J. S. JACKSON.

The use of asphaltum, as known by the ancient and prehistoric races, is one of the "lost arts" which has been developed but little by the people of modern times. It is first known of as being found in the vicinity of the Dead Sea and floating on its surface.

One of the early uses was for coating ships' bottoms, embalming dead bodies (the latter being clearly shown in the mummified bodies being exhumed from the pyramids, where they have lain preserved for ages past).

The durability of asphaltum is shown as used in the structures of the Babylonians, Egyptians, Corinthians, and others. The mortar used in the walls of Nineveh, Babylon and Jerusalem was a mixture of asphalt and sand, as was also that used to line Corinthian reservoirs and acqueducts. The asphalt mortar is now in a perfect state of preservation and is readily melted as new material, it having lost substantially none of its cementitious qualities, notwithstanding it has been four thousand years since put in place.

An analysis of the mortar shows an average of about 20 per cent bitumen, of which 86 per cent is soluble in petroleum naphtha, showing same to be petrolene, or the life of asphaltum, there being no trace of oils other than those belonging to the series of hydro-carbon oils composing asphalt.

It is a matter of record in history that asphalt was used in the construction of a highway in Peru, being built by prehistoric races. Samples of this road have been analyzed, showing that it contained 23 per cent of bitumen, of which 92 per cent was soluble in petroleum naphtha, showing same to be petrolene. The asphalt was bright, melted easily, and showed no signs of disintegration.

The earliest records in this country are in California, consisting of walks and roofs of a building at Santa Barbara, constructed in 1820, and are in good condition, as well as a small section of sea wall built of stone laid in asphalt mortar.

The general use of asphaltum is now a matter of careful study, and the many ways in which it can be used with the best results are scarcely appreciated. We may say that our knowledge of same, as now possessed, does not extend over a period of thirty-five years, which began in a small way as a coating for iron pipe and paint and varnish base, and has developed a demand for the following:

Street Paving,	Reservoir Lining,
Sidewalks,	Roofing,
Floors,	Damp Proofing,
Pipe Dip,	Paints and Varnishes,
	Insulating,

Wood preserving and many others.

Professor DeSmedt, a Swiss chemist, was father of the asphalt industry in this country, in the way of furnishing scientific treatise, formula and analysis of same. He determined in his laboratory the different solvents that affected component parts of asphaltum.

He found that chloroform and bi-sulphate of carbon are perfect solvents for the bituminous matter contained in all asphalts; that petroleum naphtha and ether are solvents for the series of asphalt called petrolene, and the bituminous matter soluble in alcohol he called retine.

He found that a considerable amount of the bituminous matter that is soluble in bi-sulphide of carbon and chloroform is not soluble in either petroleum naphtha or alcohol, and this substance he called asphaltene.

On examination he found the bitumen that was soluble in ether or petroleum naphtha was a very sticky, gummy substance with very great cementitious properties; this he called petrolene; and that the bituminous matter not soluble in ether or petroleum naphtha was very hard and brittle without the properties contained in petrolene. He therefore concluded that an asphalt containing the largest percentage of petrolene was the most desirable. The above mentioned standards have been established in the way of formula, specifications, analysis, etc. In other words, asphaltum is divided into two properties; the percentage of retine being so inconsiderable it has practically been eliminated in all cases.

Petrolene and asphaltene being the substantial factors, it is established and accepted, as set forth by Professor DeSmedt, that asphaltum carrying a large percentage of petrolene is superior, and as a matter of protection it is generally incorporated in specifications, especially those pertaining to street paving, that the percentage of asphaltene should not exceed from 25 to 30 per cent. In some cases an arbitrary ruling is made that a material containing in excess of 25 per cent of asphaltene will not be accepted.

The asphalt industry, as first promoted in the United States on a large scale, has principally pertained to street paving, of which we have some 55,000,000 yards laid in the United States, including last season's work.

In traveling, a horse will go 272 miles over a wood pavement without slipping; 413 miles over a granite pavement without slipping; 583 miles of a sheet asphalt pavement without slipping. There is also a record of but seventy miles over what is termed rock asphalt streets, which you will understand are made of a bituminous limestone found in Europe. It is quarried in its natural condition and carries from 7 to 11 per cent of asphalt. This is removed to place of operations, where the material is reduced by heating, and laid on a street and manipulated much as an asphalt pavement is.

A great many of the Paris and Berlin streets are paved with this material. While being durable, it is not desirable on account of being slippery.

For basements or floors in elevated structures where the question of vibration is seriously to be considered, there is no material can successfully take the place of asphaltum. The ordinary floor can be laid much as an asphalt street is laid. For this particular purpose the more desirable floor is what is termed a "mastic floor." The majority of mastic floors are now laid with foreign bituminous limestone rock, though of recent years this is deemed unnecessary, as we have been able to successfully imitate the foreign product at home by taking the necessary amount of grit or gravel and very fine ground limestone and incorporating into same the necessary amount of asphalt to secure the same results as obtained with

* A paper read before the Chicago Architects' Business Association, May 12, 1905, by J. S. Jackson.

bituminous limestone, saving at least 40 per cent in cost by so doing.

As for pipe dip, I presume that there have been more attempts to substitute that material without success in this particular line than in any other branch of the industry, and utterly without success.

In the earlier days, coal tar was used with fair success, as at that time the quality of the output from gas works was superior on account of there being no water, gas, etc., and the material being absolutely a bench tar, but it has been effectually demonstrated that asphalt is superior.

I can cite you a case by way of comparison coming under my personal observation in 1891 in Oakland, California. Some distance out of the city is a tract of land called "black dobie land" lying very low. In the wet season, early in the spring, what is termed "ground water" rises very often within five or six feet of the surface. A large 36-inch main had been laid, coated with a coal tar preparation. Some two years afterward, having occasion to open the trench, it was found that the ground water had risen within about ten inches of the top of the main. The coating on the steel pipe had entirely disintegrated, making it necessary to take up the line almost a mile and a half and recoat and relay. It was found to be all right where not coming in contact with the ground water. The water presumably being impregnated with some substance contained in the dobie soil, which had attacked the coating. The line of pipe was entirely recoated with a pure asphalt material and relaid.

The chief engineer of the water company had an examination made after the second winter of the pipe being in place and found that the asphalt coating had been entirely unaffected by contact with the ground water. This, of course, is a good demonstration and speaks for itself.

It has also been substantially proven that common coating for pipe carrying salt water is not reliable, while the proper asphalt material will fully resist the action of salt water. The reader has coated the interior of pipe with asphaltum for the purpose of conveying warm salt water with good results.

As a lining for reservoirs, viaducts, etc., there is no material equal to asphaltum for many reasons. It is well known that cement concrete is absolutely not entirely impervious to moisture. In other words, it is impossible to construct a cement concrete lining for reservoir purposes without same being subjected to checking and some cracking. In other words, it is difficult to construct a monolithic body without danger of this trouble arising.

There are many practical demonstrations now in evidence showing that the only way to make a reservoir absolutely tight as to coat it with asphalt. A great many engineers of the present time are specifying that, on completion of the concrete lining of reservoirs in water works systems, that they shall in turn be coated with at least 1/8-inch of asphaltum, making them entirely water tight.

I can refer you to the new water system of the city of Cincinnati now in course of construction. Two large reservoirs are being built with a capacity of something over 400,000,000 gallons. The reservoirs have a 12-inch layer of crushed rock on the slope and bottom, followed in turn by six inch of best quality of cement concrete, finished as work of this character usually is, on top of which is placed a light coat of pure asphaltum, followed by a layer of burlap, and again a coat of asphaltum.

(*To be continued.*)

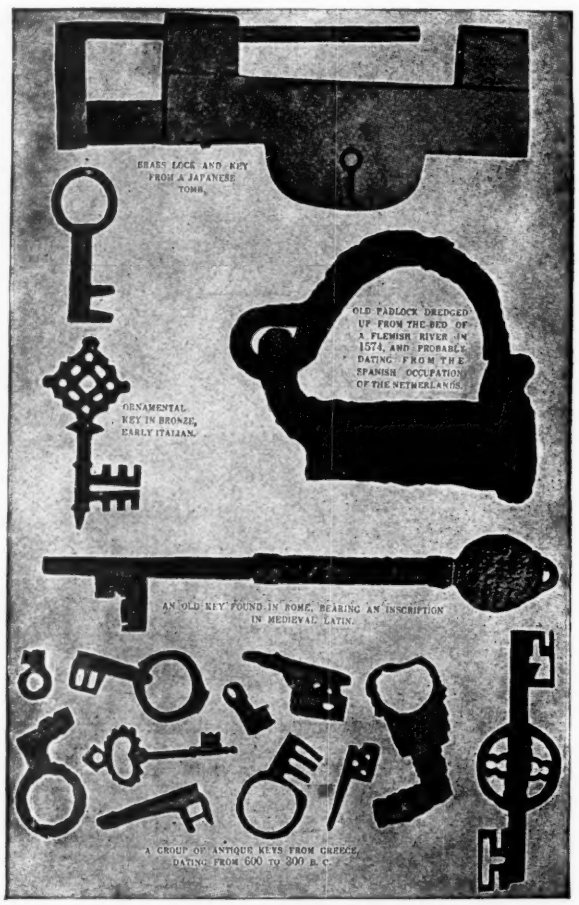
LOCKS AND HARDWARE—HISTORICAL.

(CONTINUED.)

"The examples of Roman keys found in various parts of England, and contained in the British Museum, will amply repay examination. Some of the specimens preserved at Marlborough House are not purely Roman; as cuts Nos. 10 and 11 show, they have a national character; so to speak, they are of Celtic architecture. Though the whole of them belong to the same description of lock—the warded lock—they are distinctly different. In locking and unlocking, these keys did not perform a complete revolution, and consequently they were identical with the spring locks of modern days. The Gauls, too, seem to have taken their locks from the Romans, as there is no trace of their having been acquainted with the manner of working in iron previous to the invasion of Gaul by the Romans.

NO. 14. MEDIAEVAL ANVIL AND SMITH.

"Puzzle locks have not been unknown to the less civilized nations, and their antique origin is certain. There are several known by the name of Russian, Chinese and Hindoo puzzle locks, some of which have the forms of various animals or birds, and they are locked and unlocked by pressing upon or moving some particular portions of their bodies. In one of the early volumes of the *Illustrated London News* the accompanying engraving (No. 12) and description of one of the Hindoo locks appeared, which was so far secure in proportion to the amount of reverence felt for the god it is supposed to represent. 'This curious lock,' says the journal quoted, 'is in the form of a bird, probably representing


BRASS LOCK AND KEY FROM A JAPANESE TOMB.
OLD PADLOCK DREDGED UP FROM THE BED OF A FLEMISH RIVER IN 1574, AND PROBABLY DATING FROM THE SPANISH OCCUPATION OF THE NETHERLANDS.
ORNAMENTAL KEY IN BRONZE, EARLY ITALIAN.
AN OLD KEY FOUND IN ROME, BEARING AN INSCRIPTION IN MEDIEVAL LATIN.
A GROUP OF ANTIQUE KEYS FROM GREECE, DATING FROM 600 TO 300 B. C.

ANCIENT LOCKS AND KEYS.

*An article forming part of "A Treatise on Locks and Builders' Hardware," by Henry R. Towne, president of the Yale & Towne Manufacturing Company, and past president of the American Society of Mechanical Engineers. John Wiley & Sons, publishers. Price, $3.00. It is the intention of the publishers of the INLAND ARCHITECT to publish other selections from this work. The book is profusely illustrated and contains more than 1,100 pages, 4x6½ inches.

***For all mechanical explanations that may be found in this sketch, we are indebted to the kindness of Mr. Frederick Vors.

the Hindoo god Garuda, the carrier or bearer of Vishnu, Garuda being to Vishnu what the eagle is to Jupiter. Garuda is worshiped by the natives of Madras, and his living type, a kind of large hawk, is diligently fed by the devotees. Garuda is supposed to possess human or rather divine intelligence and is much revered. Many stories are told of his discernment and cunning, and it is probably on this account that the native artist has made his lock in the form of Garuda, a sufficient guarantee, in his notion, for its acting as a guard or detector, equal or even superior to the more mechanical and scientific inventions of the kind. We should add that in this Indian lock the keyhole is on the side, one of the wings of the bird serving as a shifting escutcheon.' (*To be continued.*)

ASSOCIATION NOTES.

ARCHITECTURAL LEAGUE OF NEW YORK.

Mr. Joseph Howland Hunt has been elected to membership. No further work will be done till October.

CHICAGO ARCHITECTURAL CLUB.

Members of the club and families were the guests of William D. Gates at his summer home at Terra Cotta, Ill., on July 4. A day of sketching and an athletic program were enjoyed.

SAN FRANCISCO ARCHITECTURAL CLUB.

Atelier Charles Peter Weeks Beaux Arts Society is conducted under the auspices of the club. Monthly lectures of architectural interest are held. A class in design, construction and pen and ink is in full swing during the winter season.

WASHINGTON ARCHITECTURAL CLUB.

The final meeting for this season of the Washington Architectural Club was held in the club rooms, No. 1420 F street, on a recent evening, when the retiring officers made their reports and the annual election of the club took place.

Mr. Louis A. Simon, chief, Draughting Division of the Supervising Architect's office, was chosen president.

The officers elected being Mr. Albert L. Harris, vice-president; Leo J. Weissenborn, secretary; Warren W. Youngs, treasurer; Messrs. Clarence L. Harding, Francis B. Wheaton and Prof. Percy Ash of the George Washington University, directors, and J. Harry Blohme and Benjamin C. Flourney as auditors.

The club will resume its meetings and work in October, with a promising outlook for the ensuing year.

THE NEW JERSEY CHAPTER, A. I. A.

Recently the chapter made an examination of the condition of the building codes throughout the state. At a recent meeting the unanimous opinion of the chapter was that immediate steps should be taken to revise the building codes in all the cities in the state of New Jersey where such codes are in force. In view of the fact that many cities of the second and third class throughout the state were without any building regulations, it was further recommended by the chapter that all such cities take steps to have proper codes prepared and adopted as soon as possible governing the erection of buildings. As most, if not all, of these building codes will be revised or drawn anew by commissions, the question as to the personnel of the commissions is one of the highest importance. Naturally, the members of the Architects' Institute hold that the commissions should be composed of architects, builders and engineers.

CLEVELAND CHAPTER, A. I. A.

A uniform eight-hour work day for architects and draughtsmen has been recommended to Cleveland architects by the Cleveland chapter of the American Institute of Architects.

There has been no uniformity in the observance of national holidays and the Saturday half holiday during July and August and September by the architects of the city, and as a consequence there has been considerable confusion in the different offices. The matter was thoroughly gone over at the regular meeting of the chapter and recommendations were made for the uniform observance of the hours of labor and of holidays. The architects will close their offices on New Year's day, Decoration day, Christmas, July 4, Thanksgiving and on the afternoon of Washington's birthday and Labor day.

It was decided to recommend that eight hours be constituted a day's work for architects and draughtsmen. It was also decided to recommend that the employes of the different architects be given a Saturday half holiday during the months of July, August and September.

The Cleveland chapter of architects has a membership of about thirty.

AWARDS IN TRAVELING SCHOLARSHIPS.

THE opportunities open to architectural students for a period of study abroad are increasing year by year through the continual establishment of new traveling scholarships by universities, architectural societies, etc. Several awards have been made recently.

AWARD OF THE THIRD ALUMNI FELLOWSHIP IN ARCHITECTURE OF THE UNIVERSITY OF PENNSYLVANIA.

The third alumni fellowship in architecture of the University of Pennsylvania has been awarded to Walter Thompson Karcher, B. S. 1901, honorable mention being given to Peter De Gelleke Jr., certificate holder of the special course, 1902. This fellowship has a cash value of $1,000 and requires its holder to spend one year in travel and the study of architecture in Europe. The award of the fellowship is based upon a competitive examination in design, and judgment is rendered by a jury, the majority of whose members are practicing architects with whom the competitors have had no professional association for a year prior to the competition.

The judgment was held at the rooms of the Architectural League of New York Friday, March 10, 1905, the jury consisting of the following persons: Messrs. Austin W. Lord, Ernest Flagg, Walter Cook and Edward L. Tilton, all of New York; Clarence C. Zantzinger (representing the Alumni Society) and Warren P. Laird (representing the university).

The competition is held in two stages—first, a preliminary, to which all graduates of the school and holders of the certificate of its two-year special course are admitted under certain restrictions. From the designs submitted five are selected whose authors are admitted to the final part of the competition.

FELLOWSHIP, HARVARD UNIVERSITY.

Henry E. Warren, aged 23, of Somerville, Mass., has secured the Julia Appleton traveling fellowship in architecture at Harvard university. The award was made by the unanimous vote of a committee of practicing architects invited to co-operate with the department of architecture, and was secured by Mr. Warren in competition with three rivals, all of whom graduated from Harvard with distinction.

The prize carries with it $1,000 a year for two years, to be spent in study abroad, and what has greater professional value for the recipient prestige and honor for life in his calling.

Henry E. Warren was born in Rochester, N. H. He came to Boston with his parents in 1888 and went to Somerville in 1890. He moved to Cambridge in 1895 and entered the Rindge manual training school, graduating in 1904. He graduated from Harvard, department of architecture, in 1904, with the degree of bachelor of science, and is now concluding a year of post graduate work which he hopes will give him the degree of master of science.

While in college Mr. Warren was a member of the board of educators of the Harvard Engineering Journal, representing the department of architecture. He is vice-president of the Pen and Brush Club.

FELLOWSHIP, COLUMBIA UNIVERSITY.

The McKim fellowship in architecture from the Columbian university has been conferred upon Lucian Easter Smith, the son of the late Harry V. Smith of Evanston, Ill.

Mr. Smith is a graduate of the Evanston high school of the class of 1896. In October, 1899, he entered Columbia university, from which he was graduated in 1901.

The McKim fellowship is the American "prix de Rome" and requires of its holders at least two years' residence in Rome. They may travel in Italy, Greece and elsewhere on the continent. The American Art Academy in Rome owns a beautiful and famous old Roman villa, where the men live and work.

THE JOHN STEWARDSON SCHOLARSHIP.

The John Stewardson memorial scholarship in architecture, founded in 1896 in memory of John Stewardson of the firm of Cope & Stewardson, when $20,000 was subscribed, has been awarded this year to Carl Eugene Howell, a post-graduate student of the University of Pennsylvania. First mention was given to Henry Closson Hibbs, and commendation to Charles Foulke Rabinold. The award, which is worth $1,000, was made to Mr. Howell for his plans for a monument to commemorate the gratitude of Cuba to the United States, to be

placed on the banks of the Potomac, opposite Mt. Vernon. It shows a great central shaft surrounded by porticoes and approached from the river by a wide flight of steps.

SCHOLARSHIP OF THE WASHINGTON ARCHITECTURAL CLUB.

On June 13th Mr. Fred V. Murphy, the winner of the second traveling scholarship given by the club, sailed for the British Isles, Holland and Italy, with the intention of spending several years in the Ateliers of Paris and the Ecole des Beaux Arts. Mr. Murphy was also the winner of a $100 prize for second place in last year's club scholarship won by Mr. Dercum, who is still abroad. Mr. Murphy was born in Fond du Lac, Wis., Feb. 16, 1879. He graduated with honors from the North Division High school of Chicago, and since in Washington has taken a special architectural course at George Washington university. He is also a member of Atelier Pietsch.

ROTCH SCHOLARSHIP.

At a meeting and dinner of the Boston Society of Architects, held in the Pierce building of the Institute of Technology, William D. Crowell was announced as the winner of this year's Rotch traveling scholarship, the examinations for which recently were completed. Mr. Crowell is a draughtsman in the architectural office of Parker & Thomas in Somerset street. The problem in design on which the final decision has been made was for a salon for a large city suitable for an exhibition of the fine and industrial arts, to consist of a main hall surrounded by alcoves, galeries, etc.

The four competitors were Mr. Crowell, H. S. Pitts, E. B. Webber and G. B. Ford, three of them having come across the ocean from the Ecole des Beaux Arts, Paris, for the sole purpose of competing in the examination. These were all Americans who had studied in Boston, the terms of the scholarship requiring that the recipient should have worked at least two years in the office of a Boston architect. To Mr. Ford, a former student at Harvard and the Institute of Technology, was given a second prize of $75.

The judges, all architects, were Messrs. Sperry of Baltimore, Chamberlin of Cambridge, and Sawyer of New York. The trustees of the fund also made brief addresses explanatory of the scholarship and its history.

The announcement of the winners of the Rotch prizes was made by Clarence H. Blackall, secretary of the scholarship fund, himself the first winner of the scholarship. The drawings upon which the award was based were exhibited and remarks were made by Mr. Blackall, several of the judges and others on their merits. After the winners of the Rotch prizes had received congratulations, President Pritchett announced the winners of the prizes for architectural work at the institute. The first prize was won by Miss Ida A. Ryan, who was the only female guest at the dinner.

OUR ILLUSTRATIONS.

Residence for A. B. Campbell, Spokane, Wash. Albert Held, architect.

Residence of Benjamin Carpenter, Lakeside, Ill. Howard Shaw, architect.

Residence for F. O. Magie, Winnetka, Ill. J. C. Llewellyn, architect, Chicago.

Sherland Apartment Building, Sheridan Park, Ill. S. N. Crowen, architect.

Church of the Holy Spirit, Lake Forest, Ill. Frost & Granger, architects.

Residence of F. C. Porter, South Pasadena, Cal. Marsh & Russell, architects.

Library, Indiana University, Bloomington, Ind. Patton & Miller, architects, Chicago.

Ladies' Dormitory, Lake Forest University, Lake Forest, Ill., Frost & Granger, architects.

Residence of J. Ross Clark, Los Angeles, Cal. Hunt & Eager, architects. An exterior and an interior view are shown.

Hotel Raymond, Pasadena, Cal. Hunt & Eager, architects, Los Angeles, Cal. A double page exterior view and a view in lobby are shown.

Interior views. Residence of J. Ross Clark, Los Angeles, Cal. Hunt & Eager, architects. View in dining room and view in parlor are shown.

Herman W. Hellman Building, Los Angeles, Cal. A. F. Rosenheim, architect. Exterior view, view in main corridor, grand staircase are shown.

The Chicago Savings Bank Building, Chicago. Holabird & Roche, architects, Wells Brothers Company, contractors. This building is unique in its simplicity of line. While lacking in decorative features, it has many architectural refinements of interest. With its sixteen stories of rich brown terra cotta it is prominent and impressive and is in direct contrast with the light colored surrounding buildings. That its prominent location, high grade construction and equipment are appreciated is shown by its immediate occupancy by high class tenants.

Residence of William H. Wakefield, 435 Gladstone boulevard, Kansas City, Mo. Selby H. Kurfiss, architect. In style this house is an American adaptation of the French Renaissance. The exterior is composed of vitrified brick of deep cherry color, with heavy stone trimmings and tile roof, a special feature of which is the cornice, which projects four feet over all, having deep eaves, with exposed rafters and brackets, around the outer edge of which is a heavy copper gutter. All materials used in the exterior construction, as far as possible are non-destructible—porch columns, piers and balustrade are of brick or stone, and the floors of pebble ceramic tile. The exterior colors being red and white bring out in bold relief the architect's motif. In the interior, the front and side hall (opening off the veranda on Thompson avenue) meet at the foot of the main stairs, and at this point is a white mantel and open fire place, set in an eliptical niche, the entire back of which is tiled, forming a background for the mantel. Special designed electric fixtures assist in its decorations. The halls throughout the house are quarter sawed white oak (weathered oak finish). The dining room of the same oak (Cathedral oak finish), with heavy beamed ceiling, wood skeleton wainscoting, panels of which are lined with leather (the door to butler's pantry is included in the wainscoting), and the frieze above the plate rail is decorated in free hand oil colors with scenes from the River Rhine. The living room is in mahogany, with mahogany columns in the cased openings separating this room from both the main and side halls. Tiling is very extensively and artistically used in much of the interior work. The large kitchen, butler's pantry, refrigerator and pot pantries are all tiled, both floor and walls to the ceiling with ceramic vitreous, and Della Robbia Trent tiles, as are also the lavatory on first floor and dressing room connecting the front chambers on second floor. The special feature of the second floor is the large bathroom, to which is added a rain bath, which is made in circular form. Everything in this room is of tile. The door and window casings, floor, walls, ceiling and tub are all of Della Robbia tile, designed specially for this room. The shade of the wall tile, including the decorated cap, is Jade; the frieze and cove old ivory, with Jade and old rose decorations; the ceiling of old ivory, relieved with Jade buttons.

MOSAICS.

Several important changes in the curriculum of the Columbia University School of Architecture are announced. The most important change is the affiliation of the school with the National Academy of Design and the introduction of the atelier system, to which the trustees gave their approval some time ago. Another important change is in the time required to complete the course. Formerly four years were necessary for a degree, but in future the time is to depend entirely on the ability of the individual student. This is the same system that has been introduced into the college and other departments of the university. The requirements for admission are to be changed. After the year 1906-7 students will be admitted only on a certificate from some college which grants a bachelor's degree, signifying that the student has finished two years' work in that institution. To accommodate those who have not had this training a special course will be offered, for the completion of which a certificate is to be granted to the student. A holder of this certificate will be eligible to study for a master's degree. A draughting room is to be founded, under the supervision of C. F. McKim. Another studio is to be placed under the care of Prof. J. J. Van Kleek and Thomas Hastings. The McKim fellowship has been made annual instead of biennial, and this year it has been awarded to Lucien E. Smith, who will go to the Academy of Art, at Rome.

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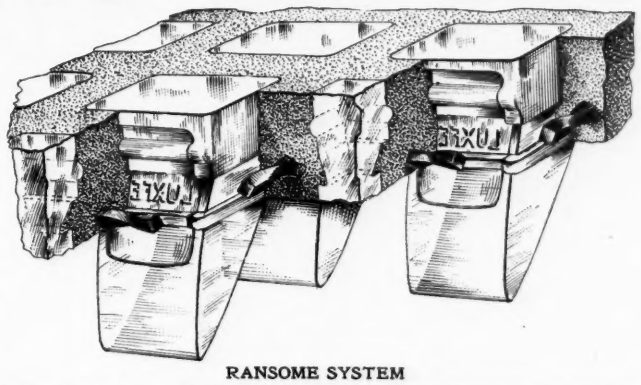

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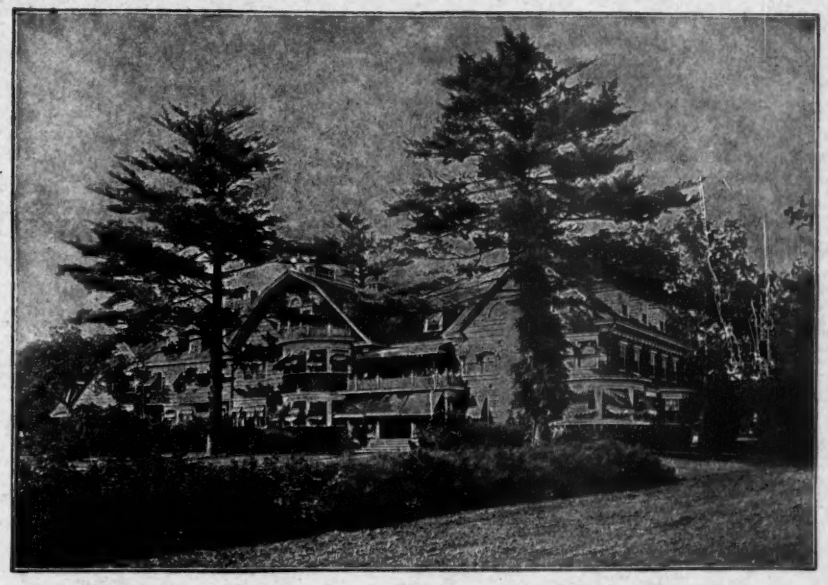

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